

Chapter 2

Answers to Worksheet

Figure 1

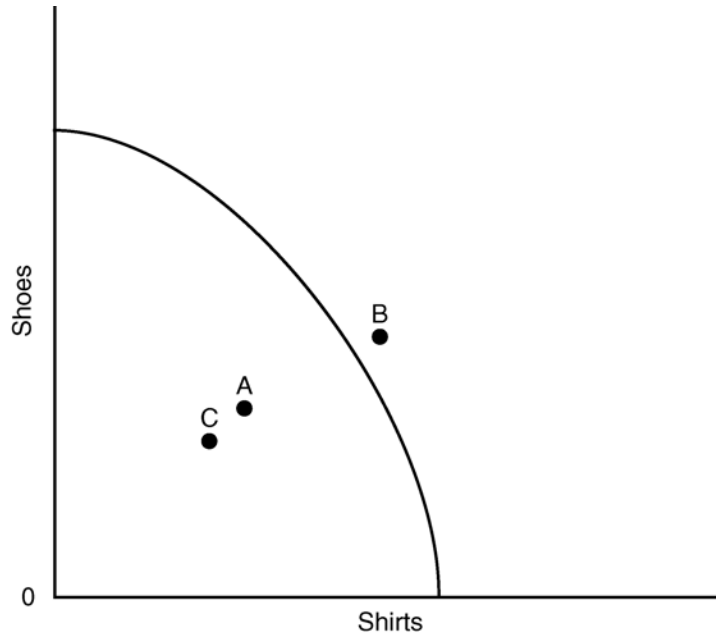
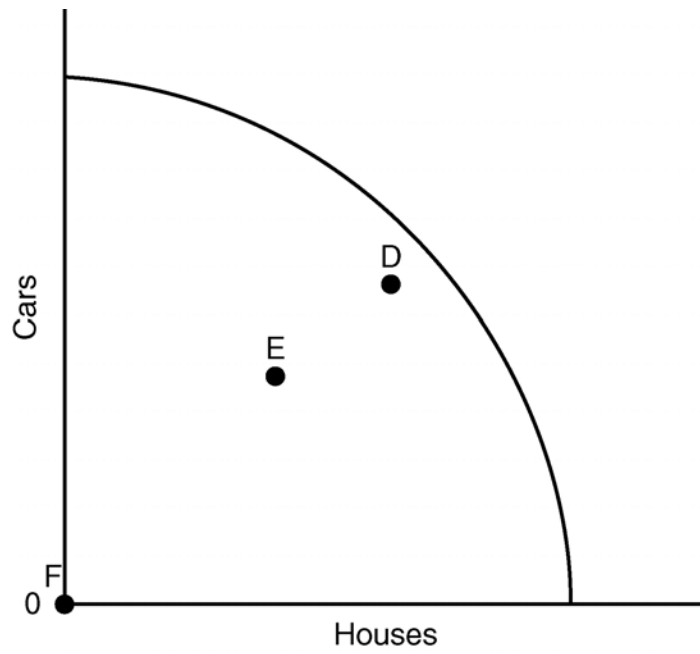


Figure 2



Chapter 2 Appendix

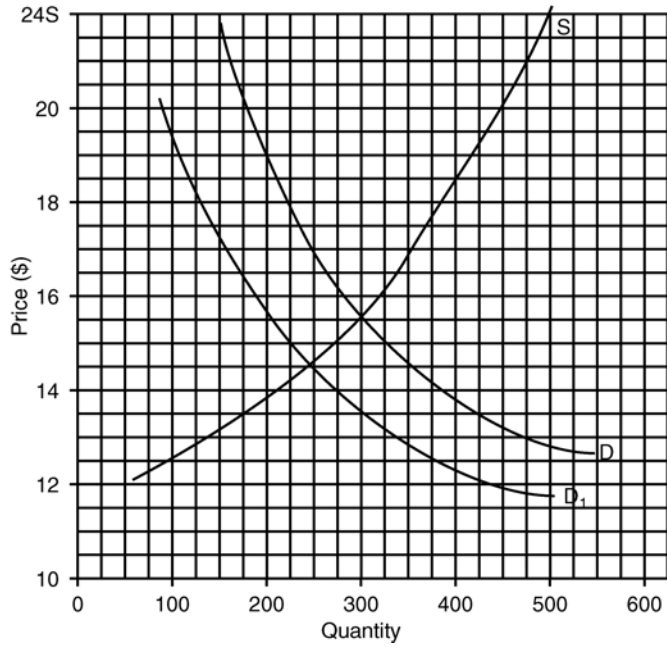
Answers to Worksheet

1. 10 visits to doctors; 1 visit to Disney World
2. A to B: lose 10 PCs; B to C: lose 20 PCs; C to D: lose 30 PCs; D to E: lose 40 PCs; E to F: lose 50 PCs.

Chapter 3

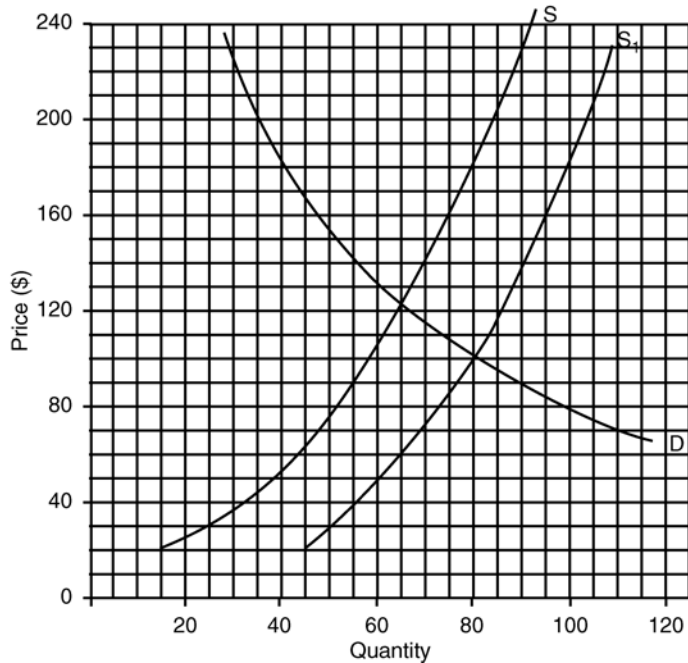
Answers to Worksheet

Figure 1



- (1) Equilibrium price = \$15.50; equilibrium quantity = 300
- (3) Equilibrium price = \$14.50; equilibrium quantity = 250
- (4) decrease; decrease

Figure 2



- (1) Equilibrium price = \$122; equilibrium quantity = 65
- (3) Equilibrium price = \$100; equilibrium quantity = 80
- (4) decrease; increase
3.
 - (a) price ceiling
 - (b) shortage
 - (c) 14
4.
 - (a) price floor
 - (b) surplus
 - (c) 15 (or a bit more)
5.
 - (a) price floor
 - (b) surplus
 - (d) 44
6.
 - (a) price ceiling
 - (b) shortage
 - (c) 40

Chapter 5

Answers to Worksheet

1. consumption = 2000, saving = -2000, autonomous consumption = 2000, and induced consumption = 0.
2. consumption = 2500, saving = 0, autonomous consumption = 2000, and induced consumption = 500.
3. consumption = 3200; saving = -3200; autonomous consumption = 3200; induced consumption = 0.
4. consumption = 3600, saving = 1600, autonomous consumption = 3200, and induced consumption = 400.
- 5.

$$APC = \frac{\text{consumption}}{\text{Disposable Income}} = \frac{\$40,000}{\$50,000} = \frac{4}{5} = .8$$

$$APS = \frac{\text{saving}}{\text{Disposable Income}} = \frac{\$10,000^*}{\$50,000} = \frac{1}{5} = .2$$

$$\begin{aligned} * \text{ Savings} &= \text{Disposable Income} - \text{consumption} \\ &= \$50,000 - \$40,000 \\ &= \$10,000 \end{aligned}$$

6.

$$APC = \frac{\text{consumption}}{\text{Disposable Income}} = \frac{\$16,000^*}{\$20,000} = \frac{16}{20} = \frac{8}{10} = .8$$

$$\begin{aligned} * \text{ Consumption} &= \text{Disposable Income} - \text{savings} \\ &= \$20,000 - \$4,000 \\ &= \$16,000 \end{aligned}$$

$$APS = \frac{\text{saving}}{\text{Disposable Income}} = \frac{\$4,000}{\$20,000} = \frac{4}{20} = \frac{1}{5} = .2$$

7.

$$\text{MPC} = \frac{\text{change in consumption}}{\text{change in Disposable Income}} = \frac{\$15,000}{\$20,000} = \frac{15}{20} = \frac{3}{4} = .75$$

$$\text{MPS} = \frac{\text{change in saving}}{\text{change in Disposable Income}} = \frac{\$5,000^*}{\$20,000} = \frac{5}{20} = \frac{1}{4} = .25$$

*Disposable

Income	-	C	=	Saving
\$50,000	-	\$40,000	=	\$10,000
70,000	-	55,000	=	15,000

(change in saving = \$5,000)

8.
$$\text{MPC} = \frac{\text{change in consumption}}{\text{change in Disposable Income}} = \frac{\$20,000^*}{\$25,000} = \frac{20}{25} = \frac{4}{5} = .8$$

*Disposable

Income	-	Saving	=	Consumption
\$75,000	-	\$5,000	=	\$70,000
100,000	-	10,000	=	90,000

(change in consumption = \$20,000)

$$\text{MPS} = \frac{\text{change in saving}}{\text{change in Disposable Income}} = \frac{\$5,000}{\$25,000} = \frac{5}{25} = \frac{1}{5} = .2$$

9. Figure 3:

- (1) Consumption = 3200; saving = -1200.
- (2) Consumption = 4000; saving = 0.
- (3) Consumption = 4800; saving = 1200.

10. Figure 4:

- (1) Consumption = 4000; saving = -1000.
- (2) Consumption = 4500; saving = 1500.
- (3) Consumption = 5000; saving = 4000.

11.

Disposable Income	Saving	(Total) Consumption	Autonomous Consumption	Induced Consumption
2000	-1000	3000	2000	1000
4000	0	4000	2000	2000
6000	+1000	5000	2000	3000

12. **Table 4**

Disposable Income	Saving	(Total) Consumption	Autonomous Consumption	Induced Consumption
3000	-2000	5000	4000	1000
6000	0	6000	4000	2000
9000	2000	7000	4000	3000

$$13. \quad APC = \frac{\text{consumption}}{\text{Disposable Income}} = \frac{4000}{4000} = 1.0$$

$$APS = \frac{\text{saving}}{\text{Disposable Income}} = \frac{0}{4000} = 0$$

$$14. \quad MPC = \frac{\text{change in consumption}}{\text{change in Disposable Income}} = \frac{100}{2000} = \frac{1}{2} = .5$$

$$MPS = \frac{\text{change in saving}}{\text{change in Disposable Income}} = \frac{1000}{2000} = \frac{1}{2} = .5$$

$$15. \quad APC = \frac{\text{consumption}}{\text{Disposable Income}} = \frac{7000}{9000} = \frac{7}{9} = .78$$

$$APS = \frac{\text{saving}}{\text{Disposable Income}} = \frac{2000}{9000} = \frac{2}{9} = .22$$

$$16. \quad \text{MPC} = \frac{\text{change in consumption}}{\text{change in Disposable Income}} = \frac{1000}{3000} = \frac{1}{3} = .33$$

$$\text{MPS} = \frac{\text{change in saving}}{\text{change in Disposable Income}} = \frac{2000}{3000} = \frac{2}{3} = .67$$

Chapter 6

Answers to Worksheet

1. 1200
2. 1200
3. 2000
4. 2000
5. (a) $\$10 \text{ billion} + \$20 \text{ billion} + \$40 \text{ billion} = \70 billion
(b) $\$20 \text{ billion} \times .5 = \10 billion (or $\$10,000,000,001$)
(c) $\$20 \text{ billion} \times .05 = \1 billion , or $\$20 \text{ billion} \times .1 = \2 billion
6. (a) $\$400 \text{ million} + \$200 \text{ million} + \$500 \text{ million} = \$1,100,000,000$.
(b) $\$400 \text{ million} \times .5 = \200 million (or $\$200,000,001$)
(c) $\$400 \text{ million} \times .05 = \20 million , or $\$400 \text{ million} \times .1 = \40 million
7. $-\$5 \text{ million}$
8. $\$11 \text{ million}$
9. gross investment (1200) – depreciation (400) = net investment (800)
10. net investment (1500) + depreciation (500) = gross investment (2000)
11. (a) $\$16.7 \text{ billion}$;
(b) $\$1.1 \text{ billion}$.

Chapter 7

Answers to Worksheet

1. 1500
2. 1500
3. 1000
4. 1000

$$5. \quad \text{ATR} = \frac{\text{Taxes paid}}{\text{Taxable income}} = \frac{\$6,000}{\$30,000} = \frac{6}{30} = \frac{1}{5} = .2 \text{ or } 20\%$$

$$6. \quad \text{ATR} = \frac{\text{Taxes Paid}}{\text{Taxable income}} = \frac{\$15,000}{\$90,000} = \frac{15}{90} = \frac{1}{6} = .17 \text{ or } 17\%$$

$$7. \quad \text{MTR} = \frac{\text{change in taxes paid}}{\text{change in taxable income}} = \frac{\$440}{\$2,000} = \frac{\$44}{\$200} = \frac{22}{100} = .22 \text{ or } 22\%$$

$$8. \quad \text{MTR} = \frac{\$18,000}{\$45,000} = \frac{18}{45} = \frac{2}{9} = .22 \text{ or } 22\%$$

9. $\$20,000 \times .28 = \$5,600$
10. $\$5,000 \times .15 = \750
11. $\$40,000 \times .062 = \$2,480$
12. $\$10,000 \times .062 = \620
13. (a) $\$20,000 \times .062 = \$1,240$
(b) $\$20,000 \times .0145 = \290
(c) $\$1,240 + \$290 = \$1,530$
(d) $\$1,530 + \$1,530 = \$3,060$
14. (a) $\$50,000 \times .062 = \$3,100$
(b) $\$50,000 \times .0145 = \725
(c) $\$3,100 + \$725 = \$3,825$
(d) $\$3,825 + \$3,825 = \$7,650$

15. (a) \$1.8 billion
(b) \$5.6 billion
(c) \$89.5
(d) Spending on New Deal programs drove up federal government purchases.
(e) Defense spending on World War II drove up federal government purchases.

Chapter 8

Answers to Worksheet

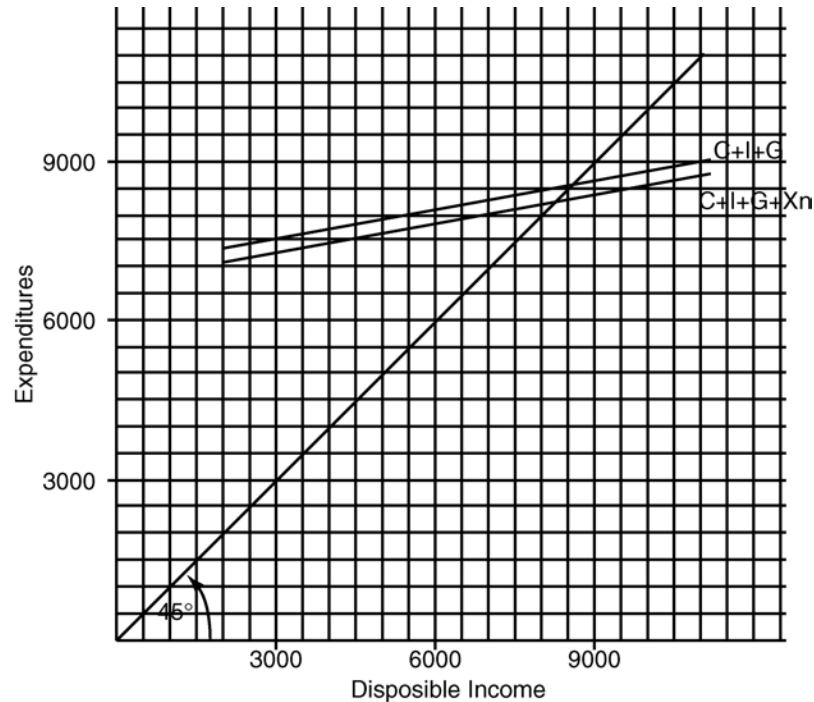
1. 1976
2. 1984
- 3.
4. 2000

Chapter 9

Answers to Worksheet

Figure 1

1.



2. $\text{GDP (8000)} - \text{Depreciation (500)} = \text{NNP (7500)}$
 $\text{NNP (7500)} - \text{Indirect Business Taxes (400)} = \text{National Income (7100)}$
3. $\text{GDP (9000)} - \text{Depreciation (700)} = \text{NNP (8300)}$
 $\text{NNP (8300)} - \text{Indirect Business Taxes (400)} = \text{National Income (7900)}$
4. $\text{National Income (5000)} + \text{Indirect Business Taxes (300)} = \text{NNP (5300)}$
 $\text{NNP (5300)} + \text{Depreciation (600)} = \text{GDP (5900)}$
5. $\text{National Income (6400)} + \text{Indirect Business Taxes (200)} = \text{NNP (6600)}$
 $\text{NNP (6600)} + \text{Depreciation (500)} = \text{GDP (7100)}$
6. $\text{Wages, salaries, and fringe benefits (5000)} + \text{profits (400)} + \text{interest (300)} + \text{rent (100)} = \text{National Income (5800)}$
7. $\text{Wages, salaries, and fringe benefits (5700)} + \text{profits (500)} + \text{interest (250)} + \text{rent (150)} = \text{National Income (6600)}$
8. $\text{Wages, salaries, and fringe benefits (6100)} + \text{interest (400)} + \text{profits (500)} + \text{rent (150)} = \text{National Income (7150)}$
 $\text{National Income (7150)} + \text{Indirect business taxes (250)} = \text{NNP (7400)}$
 $\text{NNP (7400)} + \text{Depreciation (550)} = \text{GDP (7950)}$

9. Wages, salaries, and fringe benefits (7200) + interest (550) + profits (300) + rent (50) = National Income (8100).
 National Income (8100) + Indirect business taxes (400) = NNP (8500).
 NNP (8500) + Depreciation (600) = GDP (9100).
10. Consumption (5800) + Investment (1000) + Government spending (1200) + Net Exports (-100) = GDP (7900).
11. Consumption (6000) + Investment (1400) + Government spending (1300) + Net Exports (-150) = GDP (8550).

12.

$$\begin{aligned} \text{Real GDP}_{2008} &= \text{GDP}_{2008} \times \frac{\text{GDP deflator}_{2001}}{\text{GDP deflator}_{2008}} \\ &= \frac{66.67}{1} \times \frac{100}{180} = 6667 \\ \% \text{ change} &= \frac{\text{change}}{\text{original number}} = \frac{667}{6,000} = 11.1 \end{aligned}$$

13.

$$\begin{aligned} \text{Real GDP}_{07} &= \text{GDP}_{07} \times \frac{\text{GDP deflator}_{96}}{\text{GDP deflator}_{07}} \\ &= \frac{60}{1} \times \frac{100}{150} = 6,000 \\ \% \text{ change} &= \frac{\text{change}}{\text{original number}} = \frac{1,000}{5,000} = \frac{1}{5} = 20\% \end{aligned}$$

14. GDP (8000) – economic bads (600) – regrettable necessities (350) + sum of household, unreported, and illegal production (1200) = 8250

15.

$$\begin{aligned}\text{Per capita GDP} &= \frac{\text{GDP}}{\text{Population}} = \frac{\$560,000,000,000}{8,000,000,000} \\ &= \$70,000\end{aligned}$$

16.

$$\begin{aligned}\text{Per capita GDP} &= \frac{\text{GDP}}{\text{Population}} = \frac{4,500}{.150} = \frac{\$450,000}{15} \\ &= \$30,000\end{aligned}$$

17.

$$\begin{aligned}\text{Real GDP}_{40} &= \text{GDP}_{40} \times \frac{\text{GDP deflator}_{30}}{\text{GDP deflator}_{40}} \\ &= \frac{12,000}{1} \times \frac{100}{200} = 6,000\end{aligned}$$

$$\begin{aligned}\text{Real per capita GDP}_{40} &= \frac{\text{Real GDP}_{40}}{\text{Population}_{40}} \\ &= \frac{6,000}{.021} = \$28,571\end{aligned}$$

$$\text{Real per capita GDP}_{30} = \frac{\text{GDP}}{\text{Population}} = \frac{500}{.020} = \frac{\$50,000}{2} = \$25,000$$

$$\% \text{ change} = \frac{\$3,571}{\$25,000} = 14.3\%$$

18.

$$\text{Real GDP}_{2020} = \text{GDP}_{2020} \times \frac{\text{GDP deflator}_{05}}{\text{GDP deflator}_{20}}$$

$$= \frac{1333}{1} \times \frac{100}{150} = 1333$$

$$\text{Real per capita GDP}_{20} = \frac{\text{Real GDP}_{20}}{\text{Population}}$$

$$= \frac{1,333}{.033} = \frac{1,333,000}{33}$$

$$= \$40,394$$

$$\text{Real Per Capita GDP}_{05} = \frac{\text{GDP}}{\text{Population}} = \frac{1,000}{.03} = \$33,333$$

$$\% \text{ change} = \frac{\text{change}}{\text{original number}} = \frac{\$7,061}{\$33,333} = 21.2\%$$

19. (a) \$942.6 billion and \$673.4 billion

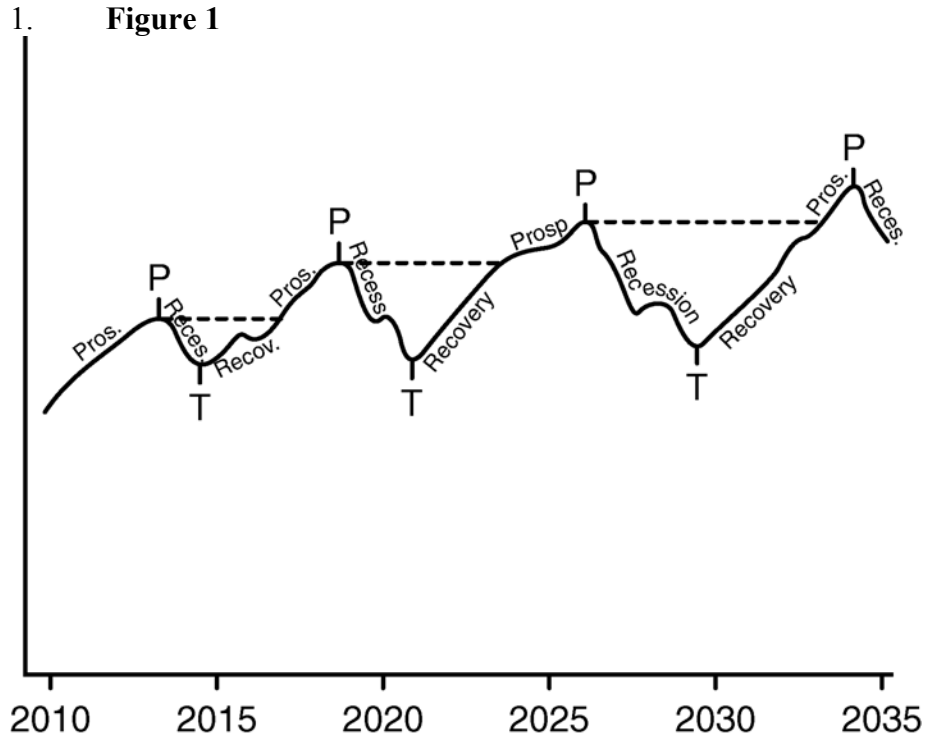
(b) 28.6 percent

20. 1992

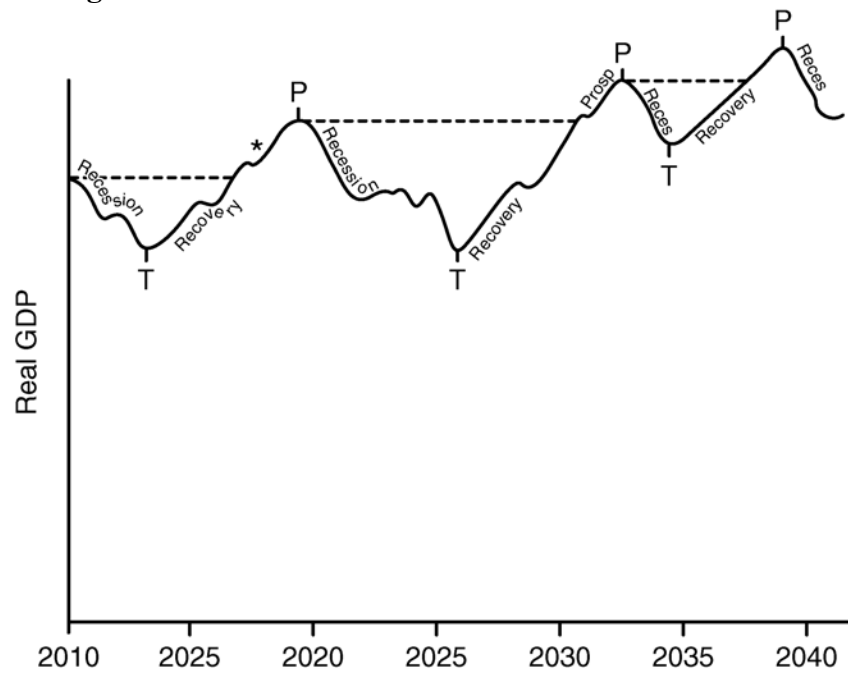
Chapter 10

Answers to Worksheet

Label the graph in Figure 1 with respect to the three phases of the business cycle and the cycle turning points.



2. **Figure 2**



*We don't know when the recovery ends and the prosperity begins because we don't know the level of the previous peak.

3. (a) 900 (or 950)
(b) 1600 (1550 – 1650)
(c) 0

4. Labor force = employed (113 million) + unemployed (12 million) = 125 million

$$\begin{aligned}\text{Unemployment rate} &= \frac{\text{unemployed}}{\text{labor force}} \\ &= \frac{12 \text{ million}}{125 \text{ million}} \\ &= 9.6\%\end{aligned}$$

5. Labor force = employed (140 million) + unemployed (10 million) = 150 million

$$\begin{aligned}\text{Unemployment rate} &= \frac{\text{unemployed}}{\text{labor force}} \\ &= \frac{10 \text{ million}}{150 \text{ million}} = \frac{1}{15} = 6.7\%\end{aligned}$$

6. 3%
7. 9%
8. $234.1 - 100 = 134.1\%$
9. $302.7 - 100 = 202.7\%$

10. $\% \text{ change} = \frac{\text{change}}{\text{original number}} = \frac{26.5}{135.9} = 19.5\%$

11. $\% \text{ change} = \frac{\text{change}}{\text{original number}} = \frac{40}{160} = \frac{4}{16} = \frac{1}{4} = 25\%$

12. Nominal rate = real rate + expected rate of inflation
 = 7% + 4%
 = 11%
13. Real rate = nominal rate – expected rate of inflation
 = 15% – 9%
 = 6%
- 14.

A. July 1994

Item	Quantity	Price	Quantity × Price
Car lease	0.4	\$300.00	\$120
Visit to doctor	1.0	50.00	50
Pound of Steak	8.0	2.50	20
Pair of jeans	0.7	30.00	21
Mortgage payment	1.0	850.00	850
Video rental	28.0	2.00	56
(a) Total			1117

B. July 2004

Item	Quantity	Price	Quantity × Price
Car lease	0.4	\$400.00	\$160
Visit to doctor	1.0	70.00	70
Pound of Steak	8.0	3.00	24
Pair of jeans	0.7	40.00	28
Mortgage payment	1.0	1000.00	1000
Video rental	28.0	2.00	56
(b) Total			1338
(c)	119.8		
(d)	19.8%		

15.

A. December 1999

Item	Quantity	Price	Quantity × Price
Car lease	0.5	\$250	\$125
Visit to doctor	1.2	60	72
Motel rental	3.6	40	144
Health club fee	1.0	25	25
Pair of shoes	0.4	60	24
Quart of milk	40.0	0.80	32
Mortgage payment	1.0	750	750
(a) Total			1172

B. December 2009

Item	Quantity	Price	Quantity × Price
Car lease	0.5	\$380	\$190
Visit to doctor	1.2	85	102
Motel rental	3.6	55	198
Health club fee	1.0	45	45
Pair of shoes	0.4	70	28
Quart of milk	40.0	1.00	40
Mortgage payment	1.0	1000	1000
(b) Total			1603

(c) 136.8

(d) 36.8%

16. (a) 1905

(b) 1910

17. (a) 2014

(b) 2020

18. unemployment rate (7.3) + inflation rate (5.9) = 13.2.

19. unemployment rate (7.9) + inflation rate (4.1) = 12.0.

20. (a) 1932; (b) 1946

21. 4 years (1946, 1974, 1979, 1980)

22. 9 years (1926, 1927, 1928, 1930, 1931, 1932, 1938, 1949, 1954)

Chapter 12

Answers to Worksheet

1. inflationary
2. \$500 billion
3. raise taxes and cut government spending
- 4.

$$\begin{aligned} \text{Multiplier} &= \frac{\text{Equilibrium GDP} - \text{Full Employment GDP}}{\text{Inflationary gap}} \\ &= \frac{1000}{500} \\ &= 2 \end{aligned}$$

5. deflationary
6. \$1 trillion
7. lower taxes and raise government spending
- 8.

$$\begin{aligned} \text{Multiplier} &= \frac{\text{Full Employment GDP} - \text{Equilibrium GDP}}{\text{deflationary gap}} \\ &= \frac{2000}{1000} \\ &= 2 \end{aligned}$$

$$9. \quad \text{Multiplier} = \frac{1}{1 - \text{MPC}} = \frac{1}{1 - .6} = \frac{1}{.4} = 2.5$$

$$10. \quad \text{Multiplier} = \frac{1}{1 - \text{MPC}} = \frac{1}{1 - .2} = \frac{1}{.8} = 1.25$$

11. Change in GDP = change in spending \times multiplier
 $= 40 \times 7$
 $= 280$
12. Change in GDP = change in spending \times multiplier
 $= -20$
 $= -80$

$$\begin{aligned}
13. \quad \text{New GDP} &= \text{initial GDP} + \text{change in spending} \times \text{multiplier} \\
&= 6000 + (20 \times) \\
&= 6000 + 180 \\
&= 6180
\end{aligned}$$

$$\begin{aligned}
14. \quad \text{New GDP} &= \text{initial GDP} + \text{change in spending} \times \text{multiplier} \\
&= 8900 + (-30 \times 6) \\
&= 8900 + (-180) \\
&= 8900 - 180 \\
&= 8720
\end{aligned}$$

$$15. \quad \text{Multiplier} = \frac{1}{1 - \text{MPC}} = \frac{1}{1 - .5} = \frac{1}{.5} = 2$$

$$\begin{aligned}
\text{New GDP} &= \text{initial GDP} + \text{change in spending} \times \text{multiplier} \\
&= 9000 + (30 \times 2) \\
&= 9000 + 60 \\
&= 9060
\end{aligned}$$

$$16. \quad \text{Multiplier} = \frac{1}{1 - \text{MPC}} = \frac{1}{1 - .8} = \frac{1}{.2} = 5$$

$$\begin{aligned}
\text{New GDP} &= \text{initial GDP} + \text{change in spending} \times \text{multiplier} \\
&= 7500 + (-20 \times 5) \\
&= 7500 + (-100) \\
&= 7500 - 100 \\
&= 7400
\end{aligned}$$

17.

$$\begin{aligned}
\text{Multiplier} &= \frac{\text{Equilibrium GDP} - \text{Full - Employment GDP}}{\text{Inflationary gap}} \\
&= \frac{200}{50} \\
&= 4
\end{aligned}$$

18.

$$\begin{aligned}\text{Multiplier} &= \frac{\text{Full - Employment GDP} - \text{Equilibrium GDP}}{\text{deflationary gap}} \\ &= \frac{300}{60} \\ &= 5\end{aligned}$$

19.

$$\begin{aligned}\text{Multiplier} &= \frac{2000}{\text{deflationary gap}} \\ 5 &= \frac{2000}{\text{deflationary gap}}\end{aligned}$$

$$5 \times \text{deflationary gap} = 2000$$

$$\text{deflationary gap} = 400$$

20.

$$\begin{aligned}\text{Multiplier} &= \frac{2000}{\text{inflationary gap}} \\ 4 &= \frac{2000}{\text{inflationary gap}}\end{aligned}$$

$$4 \times \text{inflationary gap} = 2000$$

$$\text{inflationary gap} = 500$$

21. (a) $\$1,000 \times .8 = \800

(b) $\$800 \times .8 = \640

22.

$$(a) \text{ Multiplier } \frac{1}{1 - \text{MPC}} = \frac{1}{1 - .5} = \frac{1}{.5} = 2$$

(b) $\$10 \text{ billion} \times 2 = \20 billion

Chapter 12 Appendix

Answers to Worksheet

1. surplus of \$5 billion
2. deficit of \$25 billion
3. $\$40 \text{ billion} \times 1.5 = \60 billion
4. $\$40 \text{ billion} \times 3.5 = \140 billion
5. (a) \$100 billion
(b) deficit: $(100 - 2.5 \times 40) = (100 - 100) = \text{full employment balanced budget}$
6. (a) \$180 billion
(b) $(180 - 6 \times 40) = (180 - 240) = \$60 \text{ billion surplus}$

Chapter 13

Answers to Worksheet

1. M2 (4000) + money market mutual funds held by institutions (300) + large-denomination time deposits (400) = M3 (4700).
2. M3 (6000) – money market mutual funds held by institutions (700) – large-denomination time deposits (800) = M2 (4500).
3. M1 (3000) + money market mutual funds held by individuals (400) + small-denomination time deposits (300) + savings deposits (1000) = M2 (4700).
4. M2 (97000) – savings deposits (1100) – small-denomination time deposits (800) – money market mutual funds held by individuals (500) = M1 (4600).
5. Outstanding loans = 0
reserve ratio = 100%

6. $\frac{1800}{2000} = \frac{18}{20} = \frac{9}{10} = 90\%$

$$\frac{200}{500} = \frac{2}{5} = 40\%$$

Chapter 14

Answers to Worksheet

1. 0

2. 0

3. reserve multiplier = $\frac{1}{\text{reserve ratio}} = \frac{1}{.20} = 5$

4. $\$100,000,000 \times 5 = \$500,000,000$

5. $\frac{\$80}{\$800} = \frac{1}{10} = 10\%$

6. (a) $\$47,800,000 \times .03 = \$1,434,000$
 $252,200,000 \times .1 = \underline{25,220,000}$
 $\$26,654,000$

(b) $\$35,000,000$
 $\underline{-26,654,000}$
 $\$8,346,000$

7. (a) $\$47,800,000 \times .03 = \$1,434,000$
 $802,200,000 \times .1 = \underline{80,220,000}$
 $\$81,654,000$

(b) $\$100,000,000$
 $\underline{-81,654,000}$
 $18,346,000$

Chapter 15

Answers to Worksheet

- $MV = PQ$
 $800 \times 9 = PQ$
 $7200 = PQ$
- $MV = PQ$
 $MV = 7 \times 1200$
 $MV = 8400$
- $MV = PQ$
 $900 \times 5 = 9Q$
 $4500 = 9Q$
 $500 = Q$
- $MV = PQ$
 $M \times 8 = 6 \times 1200$
 $8M = 7200$
 $M = 900$
- V and Q would stay the same; P would rise by 8%.
- $\% \text{ change} = \frac{\text{change}}{\text{original number}} = \frac{100}{500} = \frac{1}{5} = 20\%$

V and Q would remain the same.
P would rise 20% from 4 to 4.8.

Chapter 16

Answers to Worksheet

1. (a)

Table 1

Number of Workers	Total Output	Marginal Output
0	0	
1	2	<u>2</u>
2	5	<u>3</u>
3	9	<u>4</u>
4	13	<u>4</u>
5	16	<u>3</u>
6	18	<u>2</u>
7	19	<u>1</u>
8	19	<u>0</u>
9	18	<u>-1</u>
10	16	<u>-2</u>

(b) Diminishing returns set in with the 5th worker.

(c) Negative returns get set in with the 9th worker.

2. (a)

Table 2

Number of Workers	Total Output	Marginal Output
0	0	
1	3	<u>3</u>
2	7	<u>4</u>
3	12	<u>5</u>
4	17	<u>5</u>
5	21	<u>4</u>
6	24	<u>3</u>
7	25	<u>1</u>
8	26	<u>1</u>
9	26	<u>0</u>
10	25	<u>-1</u>
11	23	<u>-2</u>
12	19	<u>-4</u>
13	11	<u>-8</u>

(b) Diminishing returns set in with the 5th worker.

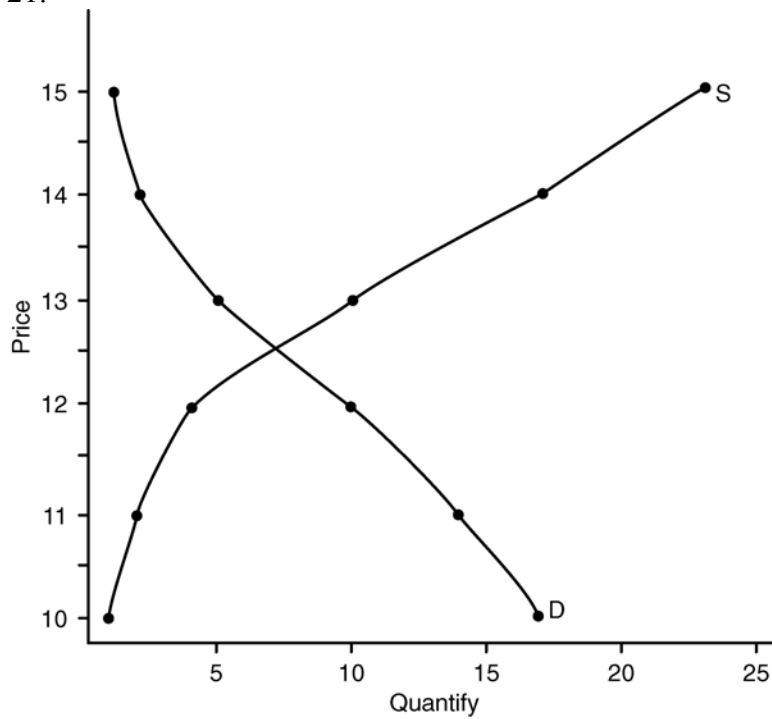
(c) Negative returns set in with the 10th worker.

Chapter 17

Answers to Worksheet

1. B
2. A
3. C
4. D
5. B
6. B
7. A
8. D
9. A
10. C
11. A
12. D
13. B
14. C
15. B
16. B
17. D
18. A
19. C
20. B

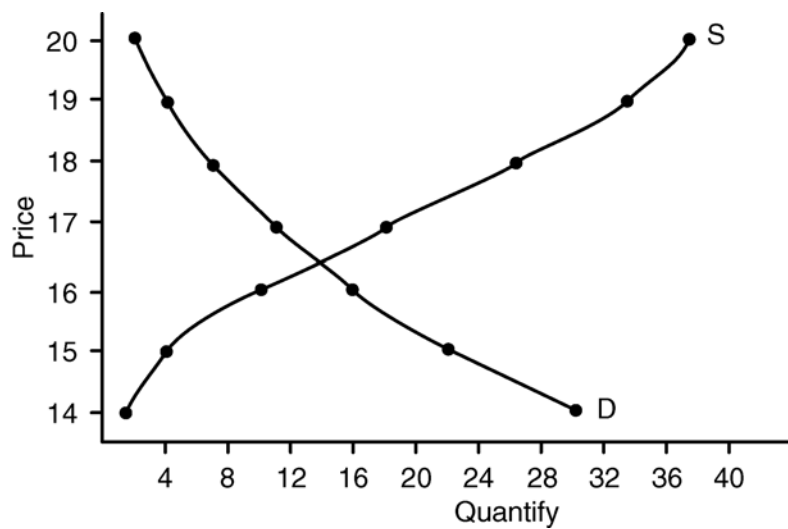
21.



Equilibrium price: \$12.60 (Anywhere between \$12.53 and \$12.65)

Equilibrium quantity: 7.25 (Anywhere between 7.1 and 7.4)

22.



Equilibrium price: \$16.40 (Anywhere between \$16.35 and 16.47)

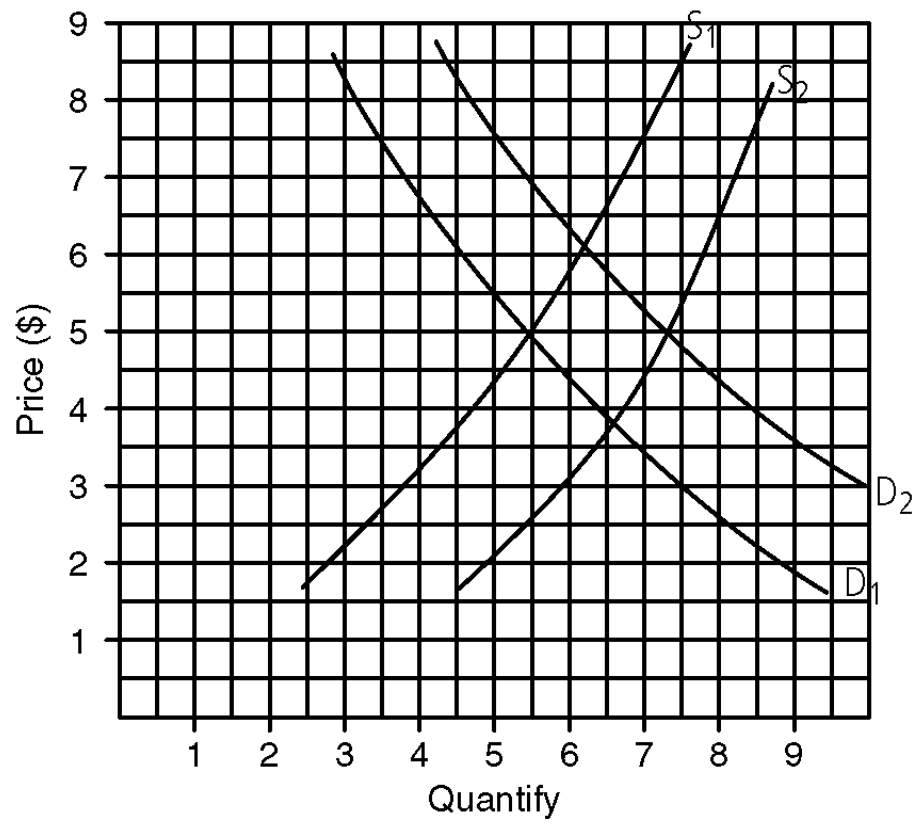
Equilibrium quantity: 13.75 (Anywhere between 13.6 and 13.9)

23. $P = \$12.60$ ($\$12.55 - \12.65)
 $Q = 27.2$ ($27 - 27.3$)

24.

Equilibrium $\frac{D_1 S_1}{\$5}$ $\frac{D_2 S_2}{\$5}$ price

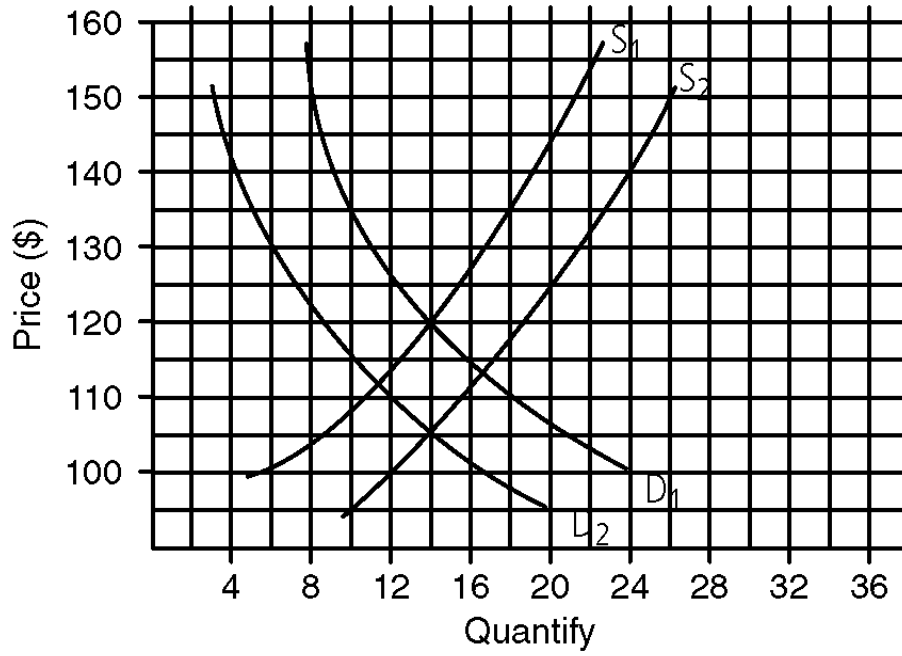
Equilibrium quantity: 5.5 7.3



25.

Equilibrium $\frac{D_1S_1}{\$120}$ $\frac{D_2S_2}{\$105}$ price:

Equilibrium quantity: 14 14



Chapter 18

Answers to Worksheet

1. $P_1 = 20$; $P_2 = 21$; $Q_1 = 10$; $Q_2 = 9$

$$(a) E = \frac{Q_2 - Q_1}{Q_2 + Q_1} \cdot \frac{P_2 + P_1}{P_2 - P_1} = \frac{9 - 10}{9 + 10} \cdot \frac{21 + 20}{21 - 20}$$

$$= \frac{-1}{19} \cdot \frac{41}{1} = \frac{-41}{19} = 2.16 \text{ or } 2.2$$

(b) Demand is slightly elastic.

2. $P_1 = 40$; $P_2 = 39$; $Q_1 = 7$; $Q_2 = 8$

$$(a) E = \frac{Q_2 - Q_1}{Q_2 + Q_1} \cdot \frac{P_2 + P_1}{P_2 - P_1} = \frac{8 - 7}{8 + 7} \cdot \frac{39 + 40}{39 - 40}$$

$$= \frac{1}{15} \cdot \frac{79}{-1} = \frac{-79}{15} = 5.27 \text{ or } 5.3$$

(b) Demand is very elastic.

3. $P_1 = 20$; $P_2 = 19$; $Q_1 = 100$; $Q_2 = 105$

$$E = \frac{Q_2 - Q_1}{Q_2 + Q_1} \cdot \frac{P_2 + P_1}{P_2 - P_1} = \frac{105 - 100}{105 + 100} \cdot \frac{19 + 20}{19 - 20}$$

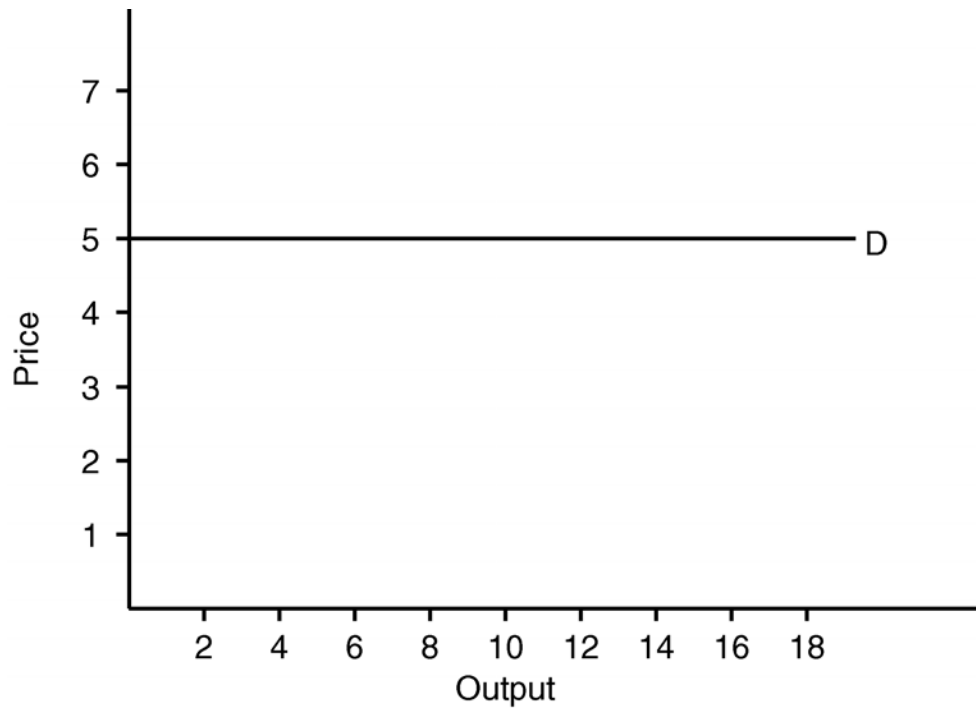
$$= \frac{5}{205} \cdot \frac{39}{-1} = -\frac{195}{205} = .095 \text{ (rounded = 1.0, or unit elastic)}$$

(b) Demand is slightly inelastic.

4. $P_1 = 5; P_2 = 5; Q_1 = 4; Q_2 = 8$

$$E = \frac{Q_2 - Q_1}{Q_2 + Q_1} \cdot \frac{P_2 + P_1}{P_2 - P_1} = \frac{8 - 4}{8 + 4} \cdot \frac{5 + 5}{5 - 5}$$

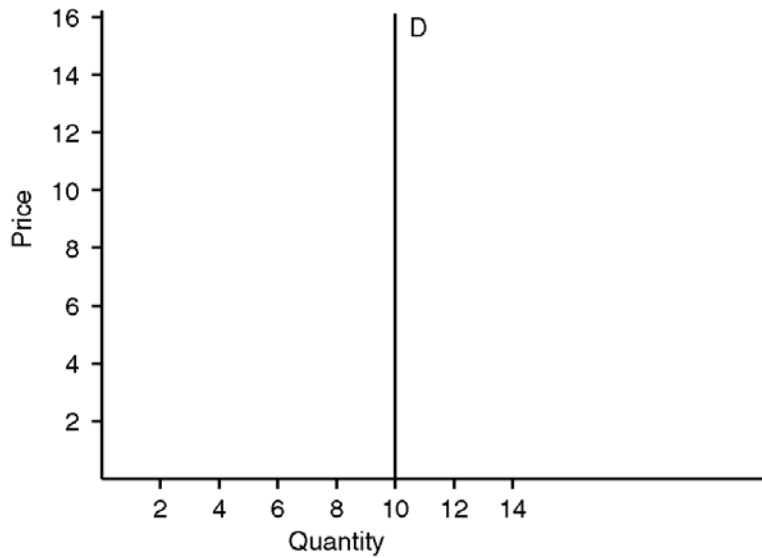
$$= \frac{4}{12} \cdot \frac{10}{0} = \frac{40}{0} = \text{undefined}$$



5. $P_1 = 4; P_2 = 8; Q_1 = 10; Q_2 = 10$

$$E = \frac{Q_2 - Q_1}{Q_2 + Q_1} \cdot \frac{P_2 + P_1}{P_2 - P_1} = \frac{10 - 10}{10 + 10} \cdot \frac{8 + 4}{8 - 4}$$

$$= \frac{0}{10} \cdot \frac{12}{4} = \frac{0}{80} = 0$$



6. (a) \$2
 (b) \$0.25
 (c) \$1.75

7. (a) \$12
 (b) \$10
 (c) \$2

8.

$$E = \frac{\% \text{ change in Q}}{\% \text{ change in P}}$$

$$3 = \frac{\% \text{ change in quantity}}{100\%}$$

30% = quantity will fall by 30%

9.

$$E = \frac{\% \text{ change in Q}}{\% \text{ change in P}}$$

$$0.5 = \frac{\% \text{ change in quantity}}{10\%}$$

5% = quantity will rise by 5%

10.

$$E = \frac{\% \text{ change in Q}}{\% \text{ change in P}}$$

$$1 = \frac{\% \text{ change in quantity}}{1}$$

1% = quantity will fall by 1%

Chapter 19

Worksheet Solutions

Table 1

Price	Quantity Demanded	Marginal Utility	Total Utility
\$12	1	\$12	\$12
10	2	10	22
7	3	7	29
5	4	5	34
3	5	3	37
2	6	2	39

- (a) \$37

(b) \$3

(c) Consumer surplus = What you are willing to pay (\$39) – what you have to pay
($\$2 \times 6 = \12) = \$27.

(d) \$29

(e) \$7

(f) Consumer surplus = $\$34 - (\$5 \times 4 = \$20) = \14

Table 2

Price	Quantity Demanded	Marginal Utility	Total Utility
\$7.50	1	\$7.50	\$7.50
6.50	2	6.50	14.00
5.00	3	5.00	19.00
4.00	4	4.00	23.00
2.50	5	2.50	25.50
1.00	6	1.00	26.50
0.25	7	.25	26.75

2. (a) \$23
(b) \$4
(c) Consumer surplus = What you are willing to pay (\$19) – what you have to pay
($\$5 \times 3 = \15) = \$4.
(d) \$26.50
(e) \$1
(f) Consumer surplus = \$25. = ($\$2.50 \times 5 = \12.50) = \$13.

Chapter 20

Answers to Worksheet

1.

(a) **Table 1**

Output	Variable Cost	Total Cost	Marginal Cost
1	\$100	\$200	\$100
2	180	280	80
3	240	340	60
4	320	420	80

(b) \$100

2. (a)

Table 2

Output	Variable Cost	Total Cost	Marginal Cost
1	\$150	\$350	\$150
2	220	420	70
3	300	500	80
4	410	610	110

(b) \$200

3. Short run: If firm operates, it loses \$50 million. Prospective sales (\$50 million) – fixed costs (\$60 million) – variable costs (\$40 million).
If firm shuts down, it loses its fixed cost of \$60 million. The firm will operate.
Long run: The firm will go out of business since it is losing money.
4. Short run: If firm operates, it will lose \$6 million. Prospective sales (\$10 million) – fixed costs (\$5 million) – variable costs (\$11 million).
If firm shuts down, it loses its fixed costs of \$5 million. Firm will shut down.
Long run: The firm will go out of business since it is losing money.
5. Short run: If firm operates, it makes a profit of \$1 million. Prospective sales (\$15 million) – fixed costs (\$6 million) – variable costs (\$8 million).
If firm shuts down it will lose its fixed costs of \$6 million. The firm will operate.

Long run: Firm will stay in business since it is making a profit.

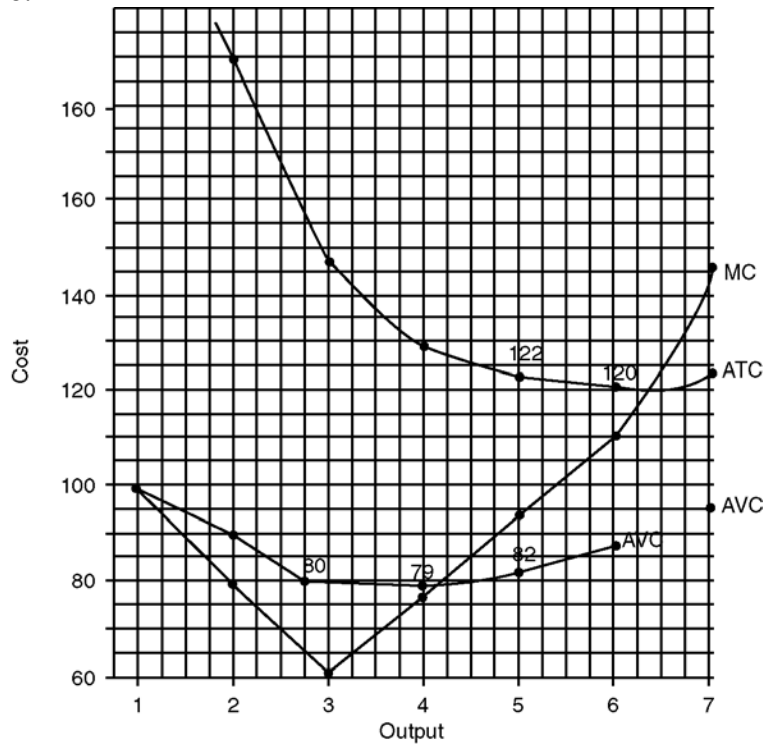
6. **Table 3**

Output	Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
1	100	300	200	100	300	100
2	180	380	100	90	190	80
3	240	440	66.67	80	146.67	60
4	316	516	50	79	129	76
5	410	610	40	82	122	94
6	520	720	33.33	86.67	120	110
7	665	865	28.71	95	123.57	145

7. **Table 4**

Output	Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
1	200	500	300	200	500	200
2	300	600	150	150	300	100
3	380	680	100	126.67	226.67	80
4	450	750	75	112.50	187.50	70
5	530	830	60	106	166	80
6	630	930	50	105	155	100
7	770	1070	42.86	110	152.86	140
8	990	1290	37.50	123.75	161.25	220

8.



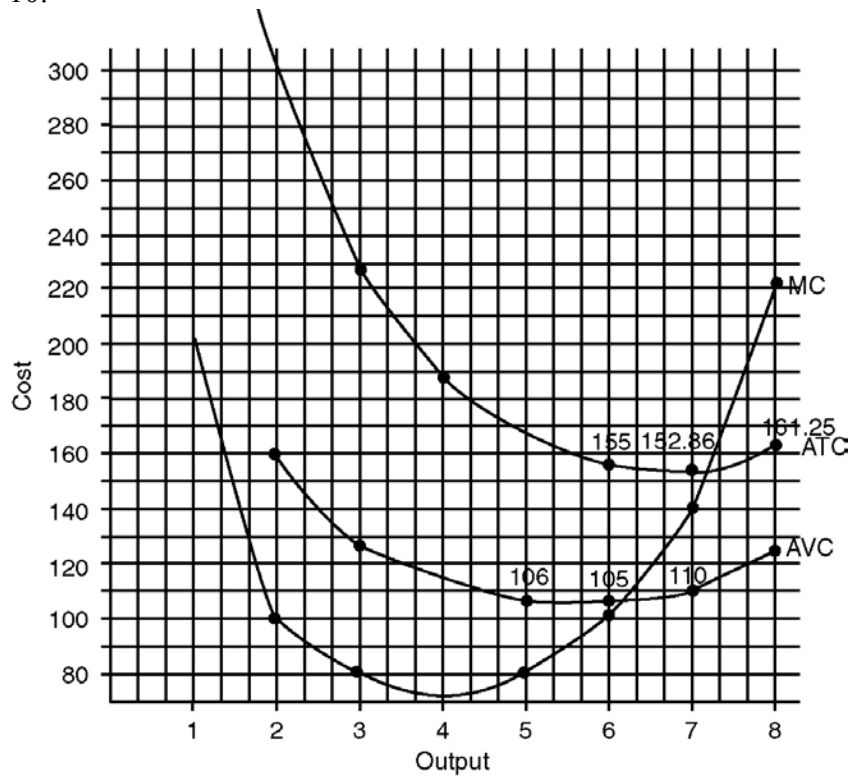
9.

Minimum points:

AVC: \$78.90 (must be less than \$79)

ATC: \$119.50 (must be less than \$120)

10.



11. Minimum points:

AVC: \$104.90 (must be less than \$105)

ATC: \$152.60 (must be less than \$152.86)

12. **Table 5**

(a)

Output	Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
1	500	1500	1000	500	1500	500
2	800	1800	500	400	900	300
3	1000	2000	333.33	333.33	666.67	200
4	1300	2300	250	325	575	300
5	1800	2800	200	360	560	500
6	2600	3600	166.67	433.33	600	800
7	3900	4900	142.86	557.14	700	1300

(c) $MC = MR$ at an output of 5.35. At output of 5 total profit = \$200 (Total Revenue of \$3,000 – Total Cost of \$2800). At output of 6 total profit = 0 (Total Revenue of \$3,600 – Total Cost of \$3600). When we maximize our total profit at output of 5.35, we must show a total profit of slightly more than \$200.

$$\begin{aligned} \text{Total profit} &= (\text{Price} - \text{ATC}) \times \text{Output} \\ &= \$600 - \$560^* \times 5.35 \\ &= \$40 \times 5.35 \\ &= \$214 \end{aligned}$$

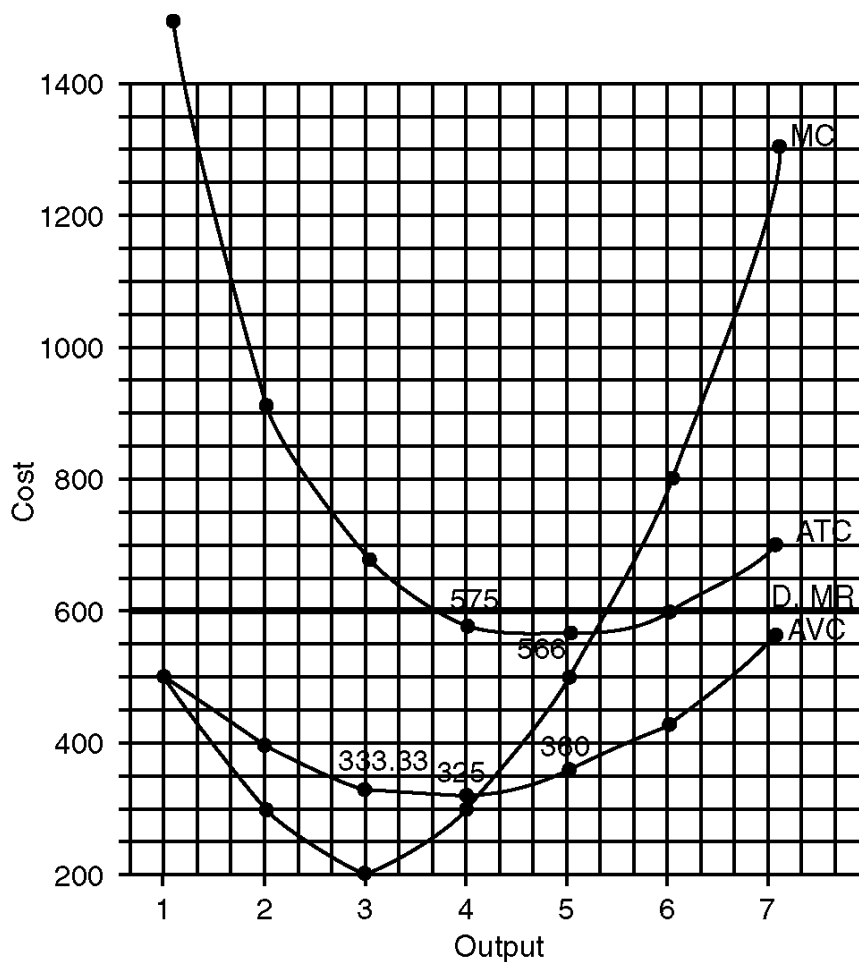
(d) Minimum points

$$\text{AVC} = \$324.50$$

$$\text{ATC} = \$559^*$$

*Minimum point of ATC is slightly lower than ATC at which firm maximizes its profit.

12. (b)



13. (a) **Table 6**

Output	Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
1	50	150	100	50	150	50
2	80	180	50	40	90	30
3	100	200	33.33	33.33	66.67	20
4	120	220	25	30	55	20
5	145	245	20	29	49	25
6	190	290	16.67	31.67	48.33	45
7	250	350	14.29	35.71	50	60
8	340	440	12.50	42.50	55	90

(c) $MC = MR$ at an output of 6.33. At output of 6 total profit = \$10 (Total Revenue of \$300 – Total Cost of \$290). At output of 7 total profit = 0 (Total Revenue of \$350 – Total Cost of \$350). When we maximize our total profit at output of 6.33, we must show a total profit of slightly more than \$10.

$$\text{Total profit} = (\text{Price} - \text{ATC}) \times \text{Output}$$

$$= (\$50 - \$48.30)^* \times 6.33$$

$$= \$1.70 \times 6.33$$

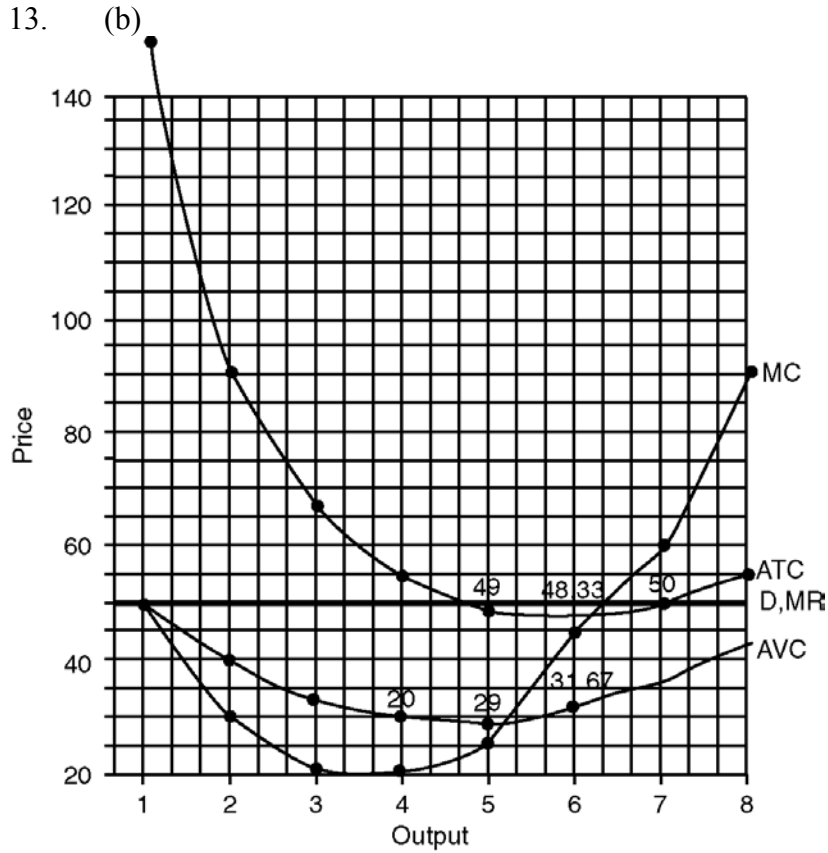
$$= \$10.76$$

(d) Minimum points:

$$AVC = \$28.70$$

$$ATC = \$48.20^*$$

*Minimum point of ATC is slightly lower than ATC at which firm maximizes its profit.



14. (a)

Table 7

Number of Workers	Total Output	Marginal Output
0	0	
1	2	<u>2</u>
2	5	<u>3</u>
3	9	<u>4</u>
4	13	<u>4</u>
5	16	<u>3</u>
6	18	<u>2</u>
7	19	<u>1</u>
8	19	<u>0</u>
9	18	<u>-1</u>
10	16	<u>-2</u>

(d) Diminishing returns set in with the 5th worker.

(e) Negative returns get set in with the 9th worker.

15. (a)

Table 8

Number of Workers	Total Output	Marginal Output
0	0	
1	3	<u>3</u>
2	7	<u>4</u>
3	12	<u>5</u>
4	17	<u>5</u>
5	21	<u>4</u>
6	24	<u>3</u>
7	25	<u>1</u>
8	26	<u>1</u>
9	26	<u>0</u>
10	25	<u>-1</u>
11	23	<u>-2</u>
12	19	<u>-4</u>
13	11	<u>-8</u>

(b) Diminishing returns set in with the 5th worker.

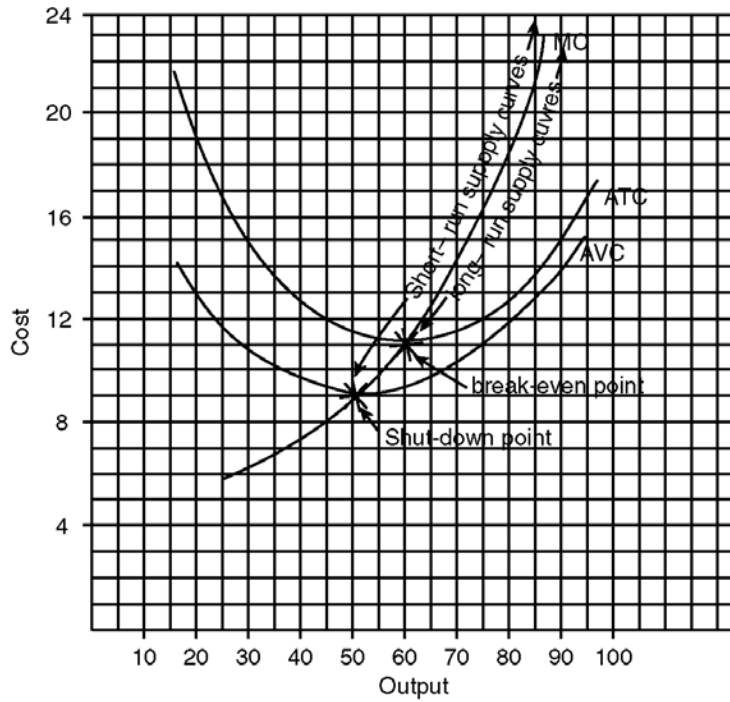
(c) Negative returns set in with the 10th worker.

Chapter 21

Answers to Worksheet

1. (a) operate
(b) operate
(c) shut down
2. (a) stay in business
(b) go out of business
(c) go out of business
3. (a) operate; stay in business
(b) operate; go out of business
(c) shut down; go out of business
4. (a) operate
(b) operate
(c) shut down
5. (a) stay in business
(b) go out of business
(c) go out of business
6. (a) operate; stay in business
(b) operate; go out of business
(c) shut down; go out of business
7. \$9
8. \$11

9. & 10.



11. Table 1

If price were:	What would the firm do in the short run?	What would the firm do in the long run?	Output in the short run
\$16	operate	stay in business	74
12	operate	stay in business	62.5
10	operate	go out of business	55
8	shut down	go out of business	0

12. \$4.50

13. \$5.50

14. & 15.

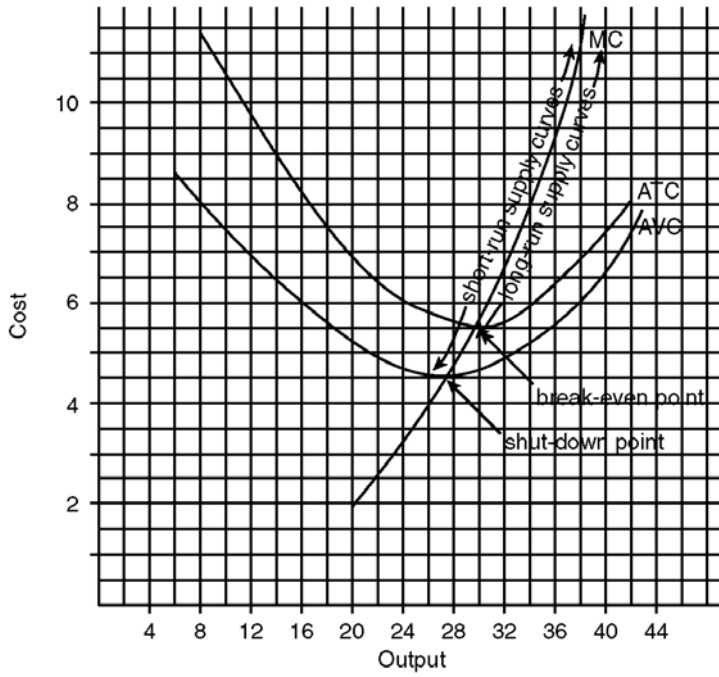


Table 2

If price were:	What would the firm do in the short run?(a)	What would the firm do in the long run?(b)	Output in the short run
\$7	operate	stay in business	32.5
6	operate	stay in business	30.7
5	operate	go out of business	28.5
4	shut down	go out of business	0

17. (a)

Table 3

Output	Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
1	10	30	20	10	30	10
2	15	35	10	7.50	17.50	5
3	18	38	6.67	6	12.67	3
4	22	42	5	5.50	10.50	4
5	28	48	4	5.60	9.60	6
6	39	59	3.33	6.50	9.83	11
7	56	76	2.86	8.00	10.86	17

(c)

(1) \$5.40

(2) \$9.45

(3) 5.7

(4) 6.7

(d) Total profit:

Output of 6: Total Revenue (90) – Total Cost (59) = 31

Output of 7: Total Revenue (105) – Total Cost (76) = 29

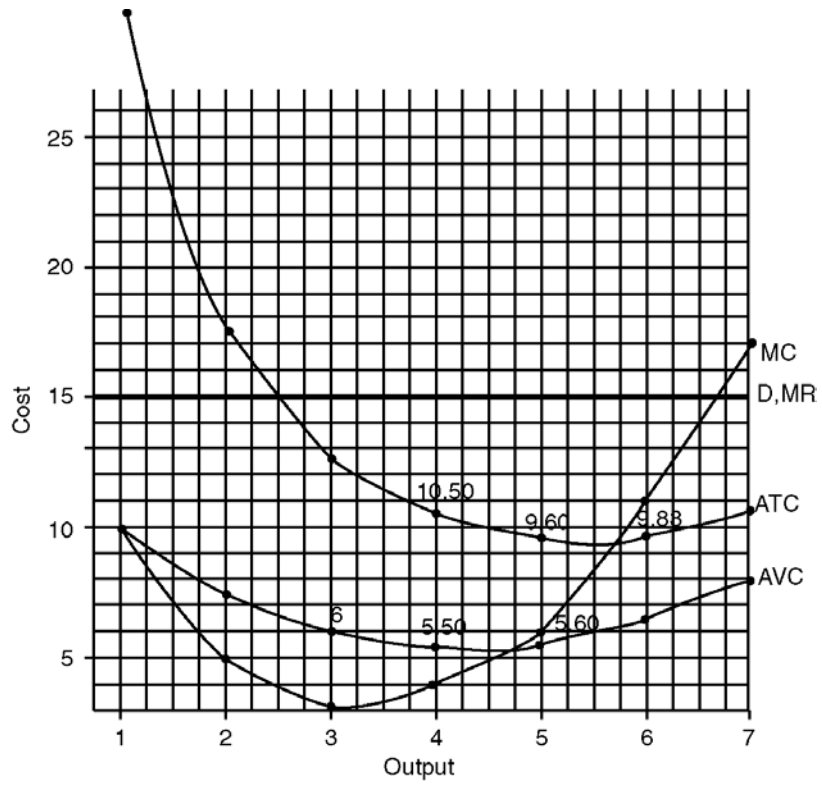
Total profit must be slightly higher than \$31:

Total profit = (Price – ATC) × output

= (\$15 – \$10.25) × 6.7

= \$4.75 × 6.7

= \$31.83



18. Table 5

Output	Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
1	200	500	300	200	500	200
2	350	650	150	175	325	150
3	450	750	100	150	250	100
4	580	880	75	145	220	130
5	760	1060	60	152	212	180
6	1000	1300	50	166.67	216.67	240
7	1400	1700	42.86	200	242.86	400

(c)

(1) \$144.25

(2) \$210.80

(3) 5.53

(4) 5.73

(d) Total profit:

Output of 5: Total Revenue (1100) – Total Cost (1060) = 40

Output of 6: Total Revenue (1320) – Total Cost (1300) = 20

Total profit must be slightly greater than \$40

Total profit = (Price – ATC) × output

= (\$220 – 212.50) × 5.73

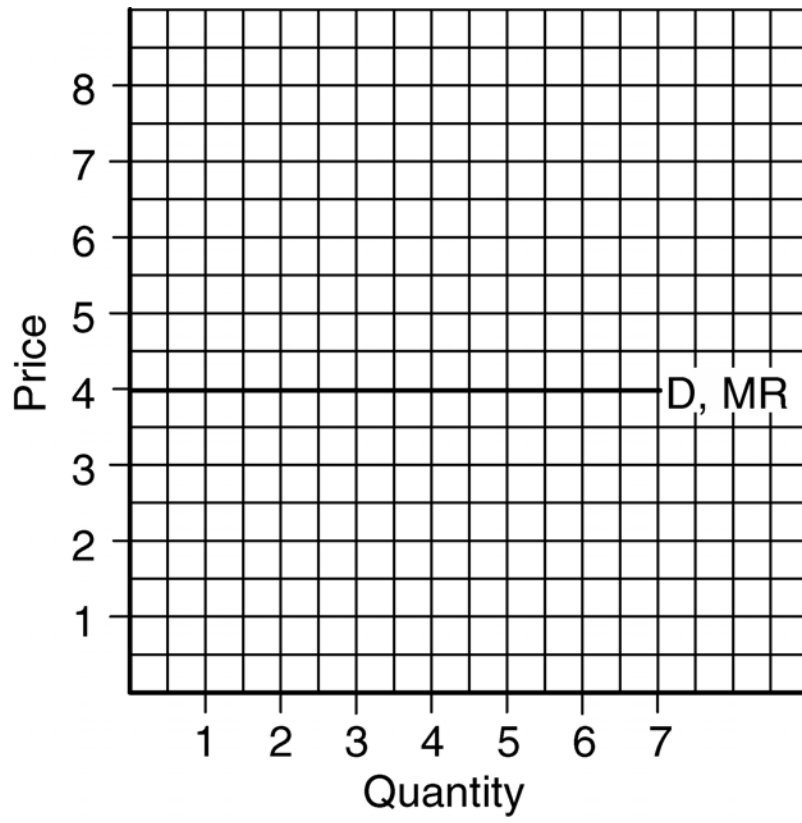
= \$7.50 × 5.73

= \$42.98

19. (a) Table 7

Output	Price	Total Revenue	Marginal Revenue
1	\$4	4	4
2	4	8	4
3	4	12	4
4	4	16	4
5	4	20	4
6	4	24	4
7	4	28	4

(b)



Chapter 22

Answers to Worksheet

Figure 1:

1. 14.1
2. Total profit = (price – ATC) × output = $(\$100 - 88.50) \times 14 = \$19.50 \times 14.1 = \$174.95^*$
3. 13
4. \$80

Figure 2:

1. 9
2. Total profit = (price – ATC) × output = $(\$50 - \$85) \times 9.5 = -\$35 \times 9.5 = -\332.50^*
3. 13
4. \$80

Figure 3:

1. 6.4
2. Total profit = (price – ATC) × output = $(\$23 - \$22.30) \times 6.3 = \$.70 \times 6.3 = \4.41^*
3. 5.1
4. \$21.90

Figure 4:

1. 64
2. Total profit = (price – ATC) × output = $(\$9 - \$11.80) \times 64 = -\$2.80 \times 64 = -\179.20^*
3. 74
4. \$11.75

* Your answer may be slightly different.

Figure 5

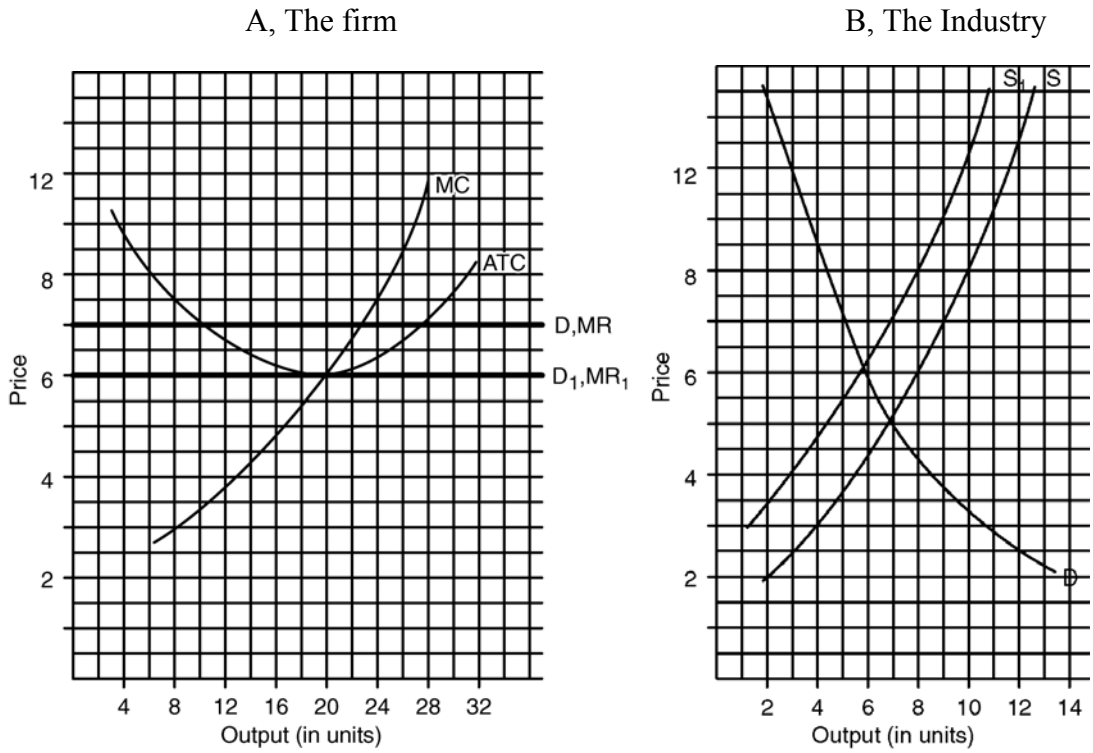
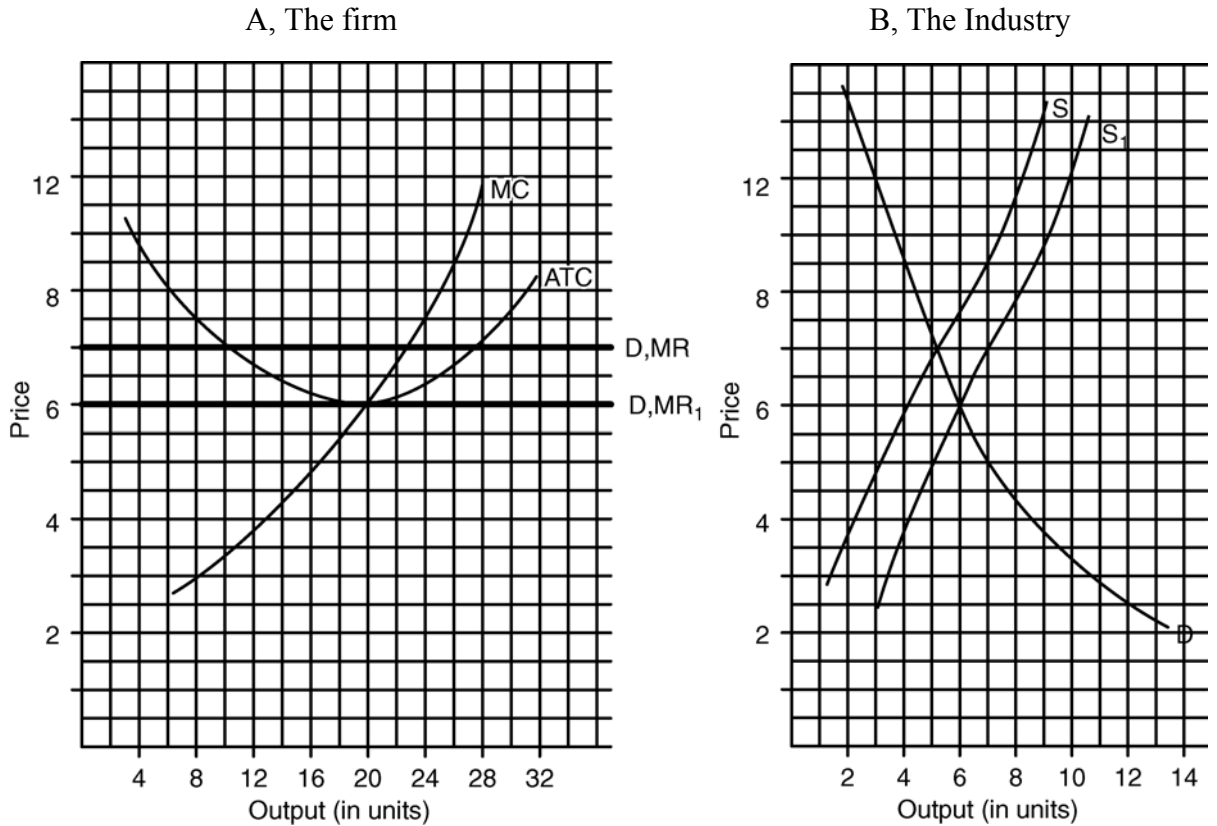


Figure 6

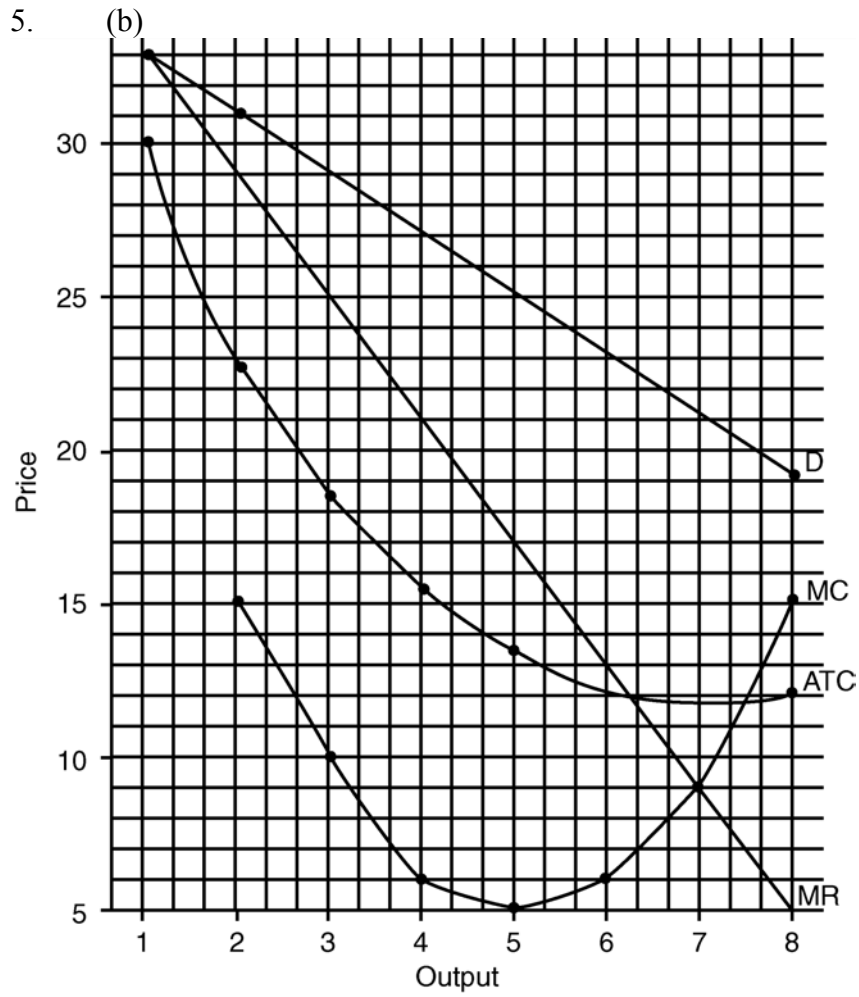


Chapter 23

Answers to Worksheet

1. (1) Total loss = (price – ATC) × output = (\$10 – \$11.40) × 48 = –\$1.40 × 48 = –\$67.20.
(2) \$10.65
2. (1) Total profit = (price – ATC) × output = (\$75.50 – \$54.25) × 12.7 = \$21.25 × 12.7 = \$269.88
(2) \$53
3. (1) Total loss = (price – ATC) × output = (\$14.30 – \$14.95) × 44.5 = –\$.65 × 44.5 = –\$28.93
(2) \$14
4. (1) Total profit = (price – ATC) × output = (\$18.10 – \$14.25) × 74 = \$3.85 × 74 = \$284.90
(2) 14
5. (a) Table 1

Output	Price	Total Revenue	Marginal Revenue	Total Cost	ATC	Marginal Cost
1	\$33	\$33	\$33	\$30	\$30	
2	31	62	29	45	22.50	\$15
3	29	87	25	55	18.33	10
4	27	108	21	61	15.25	6
5	25	125	17	66	13.20	5
6	23	138	13	72	12	6
7	21	147	9	81	11.57	9
8	19	152	5	96	12	15

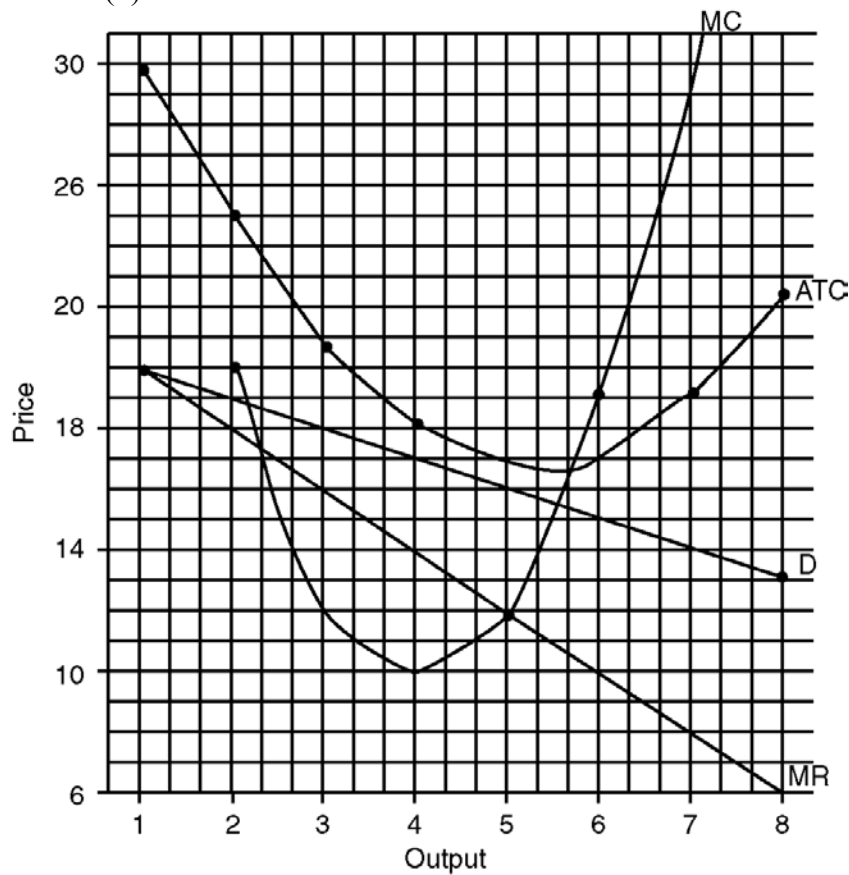


5. (c) $MC = MR$ at output of 7. Total revenue (\$147) – total cost (\$81) = \$66.
 (d) \$11.50

6. (a) Table 2

Output	Price	Total Revenue	Marginal Revenue	Total Cost	ATC	Marginal Cost
1	\$20	\$20	\$20	\$30	\$30	
2	19	38	18	50	25	\$20
3	18	54	16	62	20.67	12
4	17	68	14	72	18	10
5	16	80	12	84	16.80	12
6	15	90	10	103	17.17	19
7	14	98	8	133	19	30
8	13	104	6	178	22.25	45

6. (b)



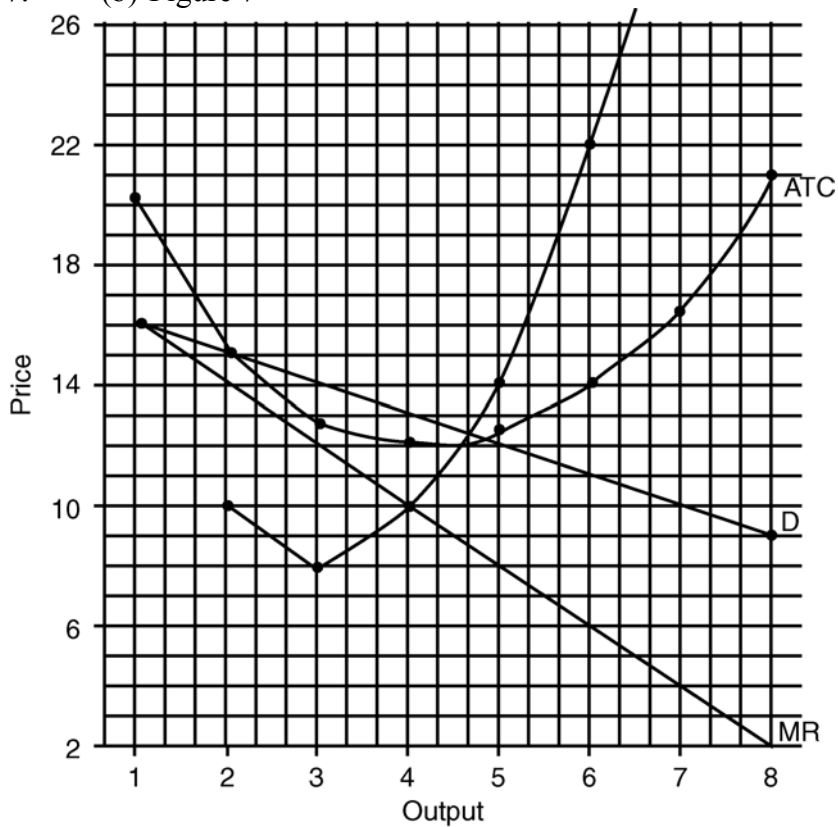
6. (c) $MC = MR$ at an output of 5. Total revenue (\$80) – total cost (\$84) = -\$4 (loss of \$4).

(d) \$16.75

7. (a) Table 3

Output	Price	Total Revenue	Marginal Revenue	Total Cost	ATC	Marginal Cost
1	\$16	\$16	\$16	\$20	\$20	
2	15	30	14	30	15	\$10
3	14	42	12	38	12.67	8
4	13	52	10	48	12	10
5	12	60	8	62	12.40	14
6	11	66	6	84	14	22
7	10	70	4	117	16.71	33
8	9	72	2	168	21	51

7. (b) Figure 7

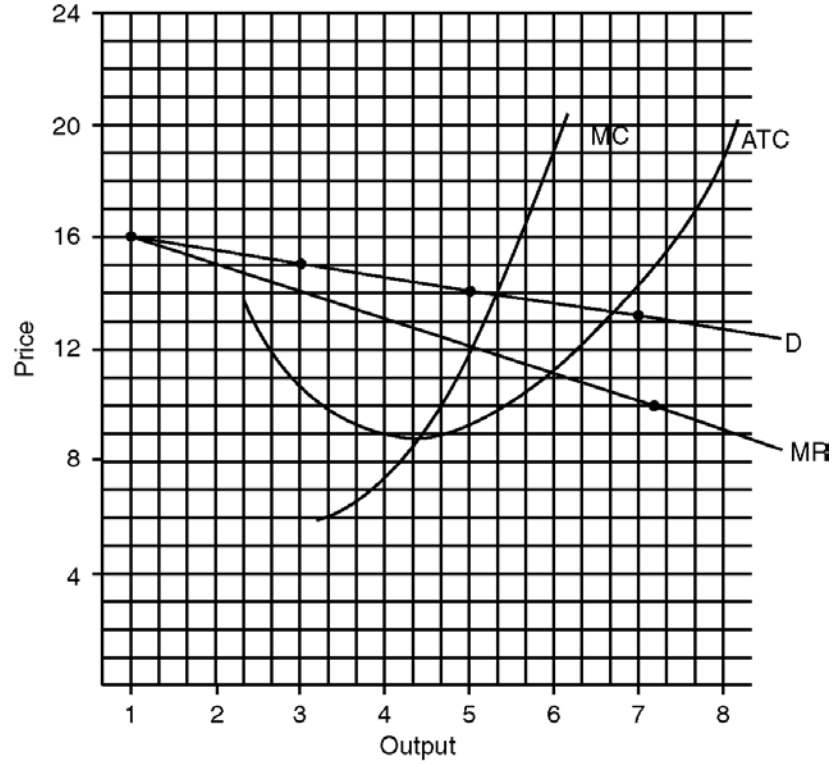


7. (c) $MC = MR$ at output of 4. Total revenue (\$52) – total cost (\$48) = \$4.
 (d) \$11.90

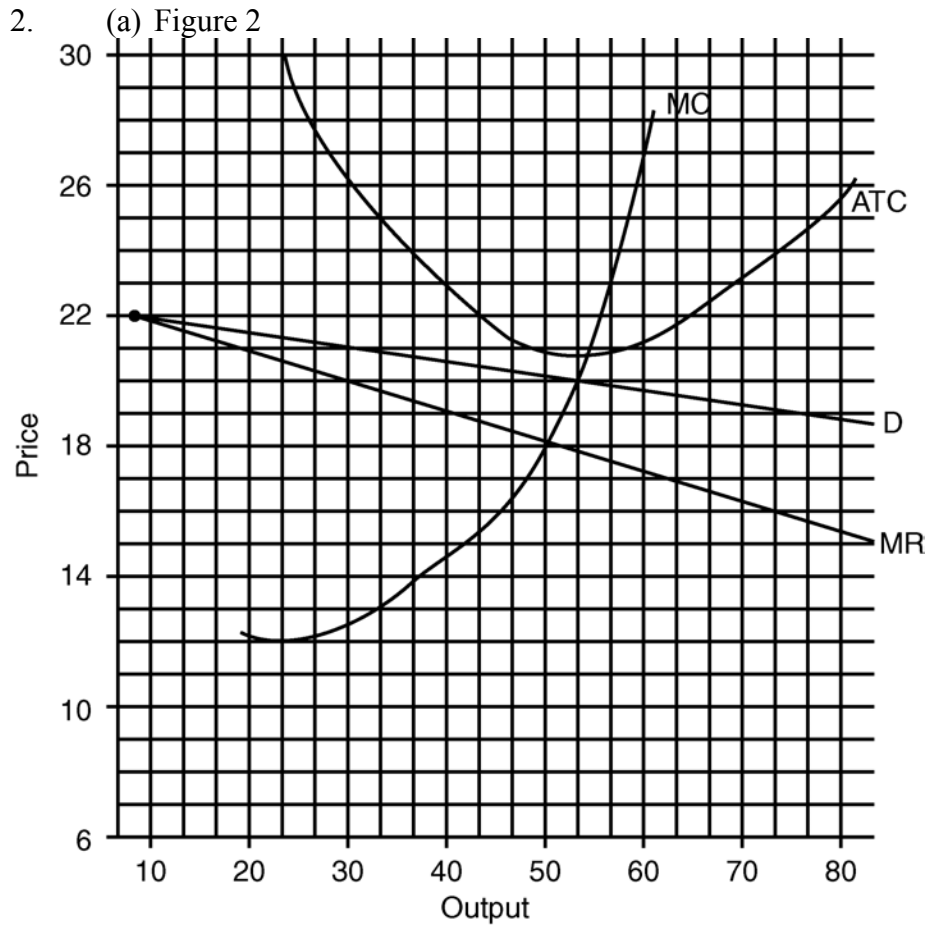
Chapter 24

Answers to Worksheet

1. (a) Figure 1

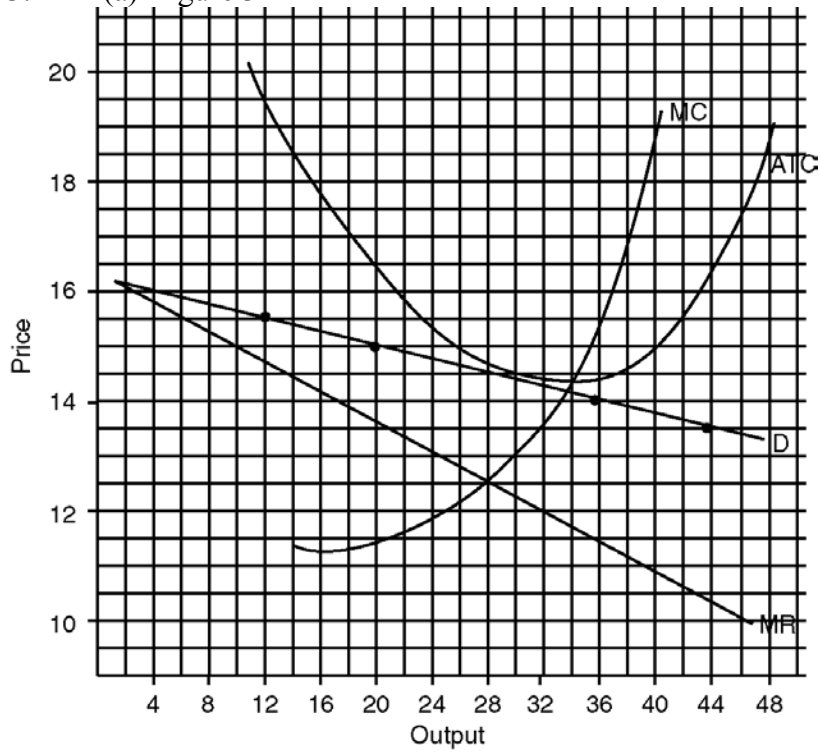


1. (b) Profit = (price - ATC) × output = (\$14 - \$9.25) × 5 = \$4.75 × 5 = \$23.75
 (c) short run
 (d) \$8.80



2. (b) $\text{Loss} = (\text{price} - \text{ATC}) \times \text{output} = (\$20.10 - \$20.90) \times 50 = -\$0.80 \times 50 = -\$40^*$
 (c) short run
 (d) \$21.80
 * Your answer may differ slightly.

3. (a) Figure 3



3. (b) Profit = (price - ATC) × output = (\$14.50 - \$14.50) × 28 = 0 × 28 = 0
(c) \$14.30

Chapter 25

Worksheet Solutions

1. (a) $20 + 20 + 15 + 10 = 65$
(b) $20^2 + 20^2 + 15^2 + 10^2 + 10^2 + 5^2 + 5^2 + 5^2 + 5^2 + 5^2$
 $400 + 400 + 225 + 100 + 100 + 25 + 25 + 25 + 25 + 25$
1350
2. (a) $40 + 20 + 5 + 5 = 70$
(b) $40^2 + 20^2 + 5^2 + 5^2 + 5^2 + 5^2 + 5^2 + 5^2 + 5^2 + 5^2$
 $1600 + 400 + 25 + 25 + 25 + 25 + 25 + 25 + 25 + 25$
2200

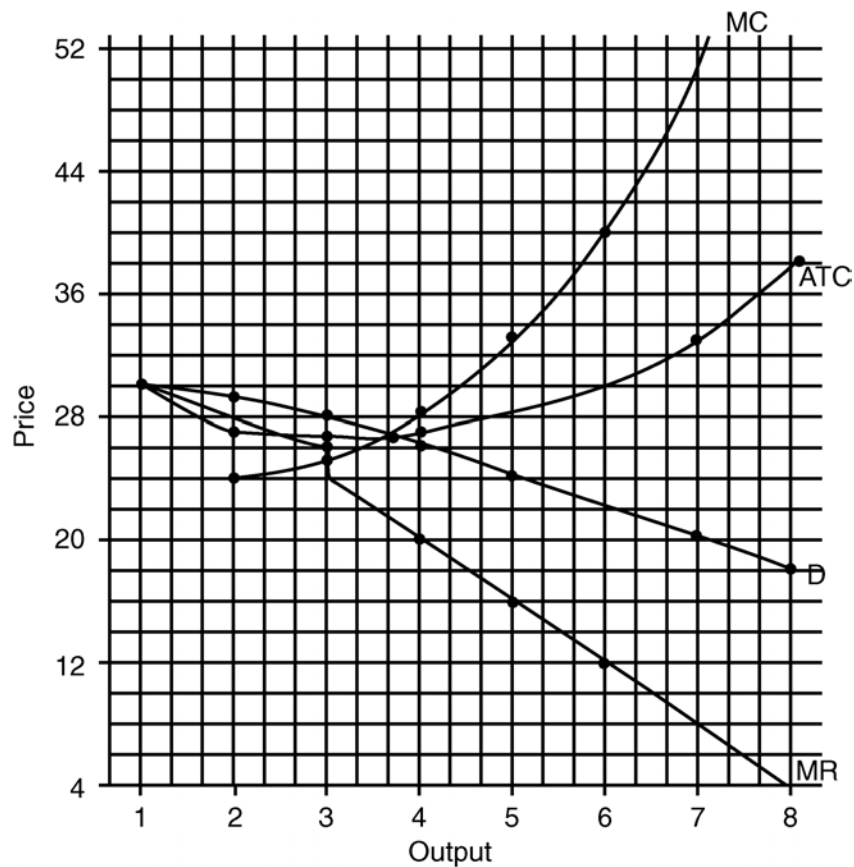
Chapter 25 Appendix Answers to Worksheet

1. (c) Total profit at output of 3 = total revenue (\$84) – total cost (\$79) = \$5.
(d) \$26.25
2. (c) Total profit at output of 4 = total revenue (\$376) – total cost (\$335) = \$41.
(d) \$82.50

1. (a) Table 1

Output	Price	Total Revenue	Marginal Revenue	Total Cost	ATC	Marginal Cost
1	\$30	\$30	\$30	\$30	\$30	
2	29	58	28	54	27	\$24
3	28	84	26	79	26.33	25
4	26	104	20	107	26.75	28
5	24	120	16	140	28	33
6	22	132	12	180	30	40
7	20	140	8	232	33.33	52
8	18	144	4	304	38	72

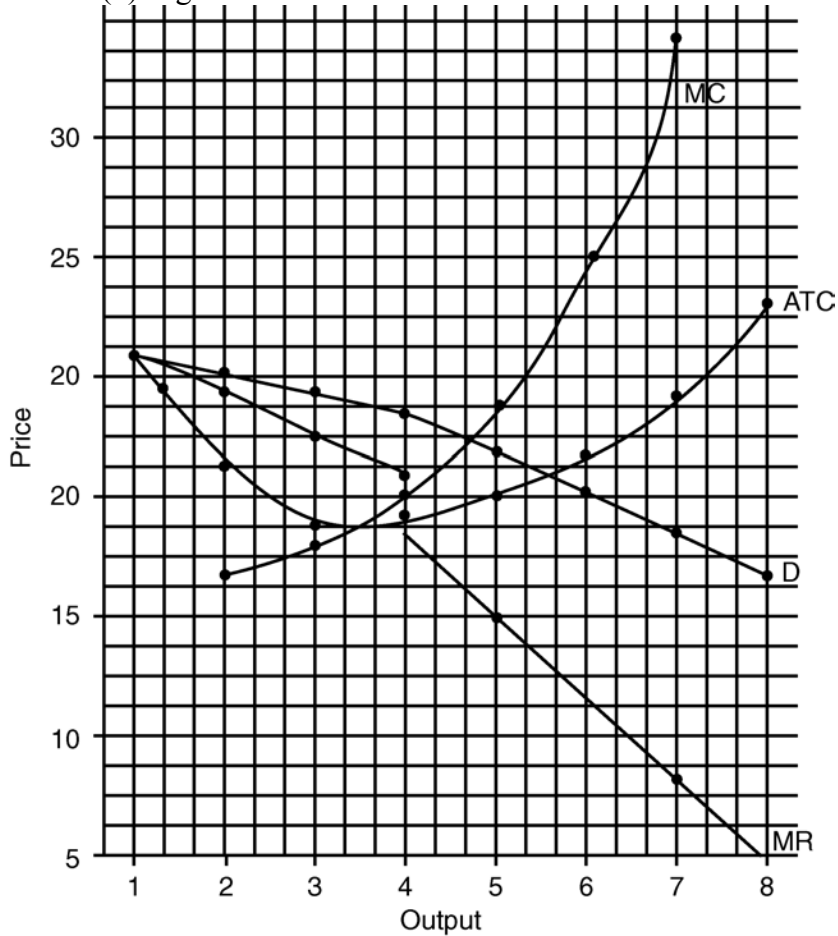
1. (b) Figure 1



2. (a) Table 2

Output	Price	Total Revenue	Marginal Revenue	Total Cost	ATC	Marginal Cost
1	\$100	\$100	\$100	\$100	\$100	
2	98	196	96	178	89	78
3	96	288	92	249	83	81
4	94	376	88	335	83.75	86
5	90	450	74	430	86	95
6	86	516	66	540	90	110
7	82	574	58	670	95.71	130
8	78	624	50	840	105	170

2. (b) Figure 2



Chapter 27

Answers to Worksheet

1. (a) Table 1

Units of Land	Output	Marginal Physical Product
1	1	1
2	3	2
3	7	4
4	11	4
5	14	3
6	16	2
7	17	1
8	18	1
9	17	-1
10	15	-2

(b) 5th

(c) 9th

2. (a) Table 2

Units of Labor	Output	Marginal Physical Product
1	2	2
2	5	3
3	10	5
4	16	6
5	22	6
6	27	5
7	31	4
8	34	3
9	36	2
10	37	1
11	36	-1
12	33	-3

- (b) 6th
- (c) 11th

3. (a) **Table 3**

Units of Labor	Output	Marginal Physical Product	Price	Total Revenue Product	Marginal Revenue Product
1	5	5	6	30	30
2	11	6	6	66	36
3	16	5	6	96	30
4	20	4	6	120	24
5	23	3	6	138	18
6	25	2	6	150	12
7	26	1	6	156	6
8	26	0	6	156	0
9	25	-1	6	150	-6
10	23	-2	6	138	-12

- (b) 3rd
- (c) 9th
- (d) (1) 0
- (2) 4
- (3) 5
- (4) 7
- (5) 7

4. (a) **Table 4**

Units of Land	Output	Marginal Physical Product	Price	Total Revenue Product	Marginal Revenue Product
1	3	3	20	60	60
2	7	4	20	140	80
3	12	5	20	240	100
4	18	6	20	360	120
5	24	6	20	480	120
6	29	5	20	580	100
7	33	4	20	660	80
8	36	3	20	720	60
9	37	1	20	740	20
10	37	0	20	740	0
11	36	-1	20	720	-20
12	34	-2	20	680	-40

(b) 6th

(c) 11th

(d) (1) 0

(2) 5

(3) 7

(4) 8

(5) 9

5. (a) **Table 5**

Units of Land	Output	Marginal Physical Product	Price	Total Revenue Product	Marginal Revenue Product
1	4	4	50	200	200
2	9	5	48	432	232
3	15	6	45	675	243
4	22	7	40	880	205
5	29	7	34	986	106
6	35	6	31	1085	99
7	40	5	29	1160	75
8	43	3	26	1118	58
9	45	2	24	1080	-38
10	46	1	23	1058	-22
11	46	0	23	1058	0
12	45	-1	—		

(b) 6th

(c) 12th

(d) (1) 0

(2) 4

(3) 5

(4) 6

(5) 8

(a) **Table 6**

Units of Labor	Output	Marginal Physical Product	Price	Total Revenue Product	Marginal Revenue Product
1	3	3	20	60	60
2	8	5	19	152	92
3	13	5	18	234	82
4	19	6	17	323	89
5	25	6	16	400	77
6	30	5	15	450	50
7	33	3	14	462	12
8	35	2	13	455	-7
9	36	1	12	432	-23
10	36	0	12	432	0
11	35	-1	—		
12	34	-2	—		

(b) 6th

(c) 11th

(d) (1) 0

(2) 5

(3) 5

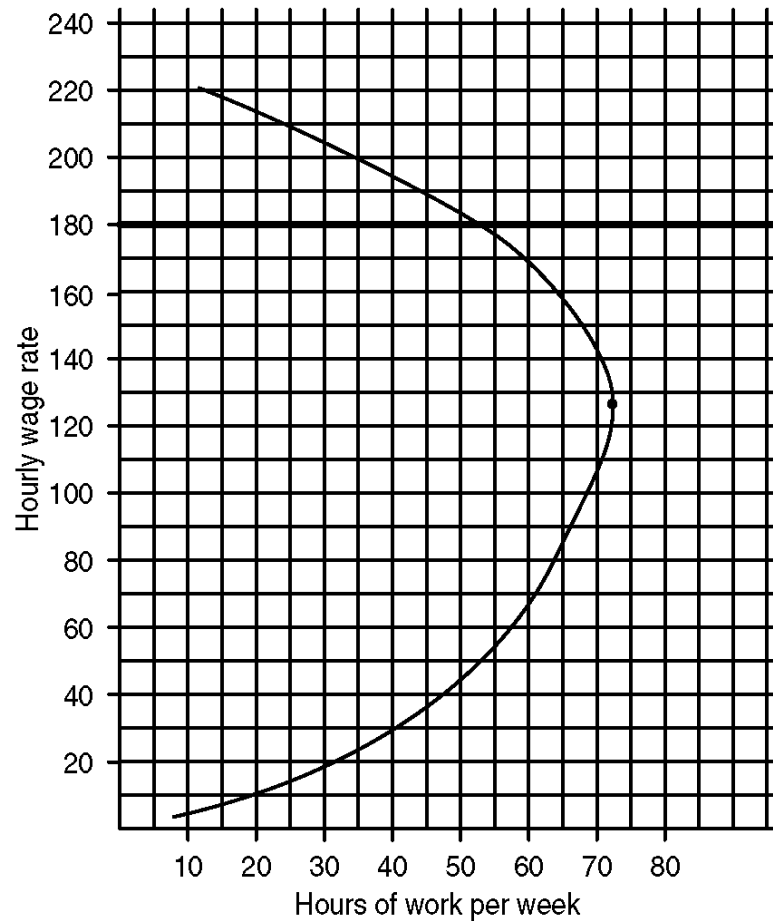
(4) 6

(5) 7

Chapter 29

Answers to Worksheet

1. Figure 1



2. Real wages (99) = Money Wages $\frac{\text{CPI}(92)}{\text{CPI}(99)} \times$

$$\begin{aligned}
 &= \frac{96}{1} \times \frac{100}{125} \\
 &= \frac{\text{change}}{\text{original number}} = \frac{\$960}{500} = \frac{46}{50} = 92\%
 \end{aligned}$$

$$3. \quad \text{Real wages (08)} = \text{Money Wages (08)} \times \frac{\text{CPI(03)}}{\text{CPI(08)}}$$

$$= \frac{500}{\cancel{70,000}} \times \frac{100}{\cancel{140}}$$

$$= \$50,000$$

$$\text{Percentage change} = \frac{\text{change}}{\text{original number}} = \frac{\$25,000}{\$25,000} = 100\%$$

$$4. \quad \text{Real wages (11)} = \text{Money Wages (11)} \times \frac{\text{CPI(07)}}{\text{CPI(11)}}$$

$$= \frac{30}{\cancel{6,000}} \times \frac{100}{\cancel{200}}$$

$$= \$3,000$$

$$\text{Percentage change} = \frac{\text{change}}{\text{original number}} = \frac{\$1,000}{\$2,000} = \frac{1}{2} = 50\%$$

Chapter 30

Answers to Worksheet

$$1. \quad \text{Value of asset} = \frac{\text{Annual income from asset}}{\text{interest rate}}$$

$$= \frac{\$800}{.16}$$

$$= \$5,000$$

$$2. \quad \text{Value of asset} = \frac{\$120,000}{.06}$$

$$= \$2,000,000$$

$$3. \quad \text{Value of asset} \frac{\$2,400}{.08} =$$

$$= \$30,000$$

$$4. \quad \text{Present value} = \$1,000 \times \frac{1}{(1+r)^n}$$

$$= \$1,000 \times \frac{1}{(1.09)^2}$$

$$= \$1,000 \times \frac{1}{1.1881}$$

$$= \$841.68$$

$$5. \quad \text{Present value} = \$10,000 \times \frac{1}{(1.07)^2}$$

$$= \$10,000 \times .712986$$

$$= \$7,129.86$$

$$6. \quad \$1.00 \times \frac{1}{(1.10)^6}$$

$$= \$1.00 \times \frac{1}{1.771561}$$

$$= \$1.00 \times .5645$$

$$= \$0.56$$

7. Sales (\$1,000,000) – Costs (\$300,000 + \$30,000 + \$10,000 + \$20,000 + \$50,000 + \$500,000 = \$910,000) = Dollar Value of Net Productivity (\$90,000).

$$\text{Net productivity of capital} = \frac{\text{Dollar Value of Net Productivity}}{\text{Capital cost}}$$

$$= \frac{\$90,000}{\$500,000} = \frac{9}{50} = 18\%$$

8. Sales (\$600,000) – Costs (\$150,000 + \$75,000 + \$75,000 + \$5,000 + \$250,000 = \$555,000) = Dollar Value of Net Productivity (\$45,000)

$$\text{Net productivity of capital} = \frac{\text{Dollar Value of Net Productivity}}{\text{Capital Cost}}$$

$$= \frac{\$45,000}{\$250,000} = \frac{45}{250} = \frac{9}{50} = 18\%$$

Chapter 32

Answers to Worksheet

1. 3 jeans = 2 wines
2. one jeans = 2 wines
3. more than 2 bottles of wine
4. more than 1 pair of jeans
5. jeans
6. wine
7. jeans
8. wine
9. 1 wheat = 3 coffees
10. 4 wheats = 1 coffee
11. more than 1 bushel of wheat
12. more than 1 bushel of coffee
13. coffee
14. wheat
15. coffee
16. wheat

Chapter 33

Answers to Worksheet

1. $\frac{1,400,000 \text{ yen}}{129 \text{ yen}} = \$10,852.71$

2. $\frac{37,000 \text{ lire}}{1,804 \text{ lire}} = \20.51

3. $\frac{\$9.00 \text{ Canadian}}{\$1.43} = \$6.29$

4. $\frac{12 \text{ pounds}}{.61 \text{ pounds}} = \19.67

5. $\frac{1,400,000 \text{ yen}}{129 \text{ yen}} = \225.23

5. $\frac{1,400,000 \text{ yen}}{129 \text{ yen}} = \225.23