

## Practice Problem Solutions

$$1. b = r_{xy} \cdot \frac{S_X}{S_Y} = .62 \cdot \frac{1.00}{2.41} = .257 \qquad a = \bar{X} - (b \cdot \bar{Y}) = 5.5 - (.257 \cdot 8.5) = 3.315$$

$$\hat{X} = bY + a = .257(6.6) + 3.315 = 5.011 \text{ hours sleep}$$

$$S_{XY} = S_X \cdot \sqrt{1-r^2} = 1.00 \cdot \sqrt{1-.62^2} = 1.00 \cdot \sqrt{1-.384} = .785$$

5.011  $\pm$  .785 hours sleep predicted for someone recalling 6.6 words.

$$2. \hat{X} = bY + a = .257(8.0) + 3.315 = 5.371$$

$$S_{XY} = S_X \cdot \sqrt{1-r^2} = 1.00 \cdot \sqrt{1-.62^2} = 1.00 \cdot \sqrt{1-.384} = .785$$

5.371  $\pm$  .785 hours sleep predicted for someone recalling 8.0 words.

$$3. \hat{X} = bY + a = .257(4.2) + 3.315 = 4.394$$

$$S_{XY} = S_X \cdot \sqrt{1-r^2} = 1.00 \cdot \sqrt{1-.62^2} = 1.00 \cdot \sqrt{1-.384} = .785$$

4.394  $\pm$  .785 hours sleep predicted for someone recalling 4.2 words.

$$4. b = r_{xy} \cdot \frac{S_Y}{S_X} = .62 \cdot \frac{2.41}{1.00} = 1.494 \qquad a = \bar{Y} - (b \cdot \bar{X}) = 8.5 - (1.494 \cdot 5.5) = .283$$

$$\hat{Y} = bX + a = 1.494(6) + .283 = 9.247 \text{ words recalled}$$

$$S_{YX} = S_Y \cdot \sqrt{1-r^2} = 2.41 \cdot \sqrt{1-.62^2} = 2.41 \cdot \sqrt{1-.384} = 1.892$$

9.247  $\pm$  1.892 recalled words predicted for someone sleeping 6 hours on weeknights.

$$5. \hat{Y} = bX + a = 1.494(8) + .283 = 11.952 \text{ words recalled}$$

$$S_{YX} = S_Y \cdot \sqrt{1-r^2} = 2.41 \cdot \sqrt{1-.62^2} = 2.41 \cdot \sqrt{1-.384} = 1.892$$

11.952 ± 1.892 recalled words predicted for someone sleeping 8 hours on weeknights.

$$6. \hat{Y} = bX + a = 1.494(4) + .283 = 5.976 \text{ words recalled}$$

$$S_{YX} = S_Y \cdot \sqrt{1-r^2} = 2.41 \cdot \sqrt{1-.62^2} = 2.41 \cdot \sqrt{1-.384} = 1.892$$

5.976 ± 1.892 recalled words predicted for someone sleeping 4 hours on weeknights.

$$7. b = r_{xy} \cdot \frac{S_Y}{S_X} = .64 \cdot \frac{12}{9} = .853 \qquad a = \bar{Y} - (b \cdot \bar{X}) = 63.3 - (.853 \cdot 39.8) = 29.351$$

The regression equation for predicting the life satisfaction score from age is:

$$\hat{Y} = bX + a = .853(X) + 29.351$$

$$8. \hat{Y} = bX + a = .853(50) + 29.351 = 42.65 + 29.351 = 72.00$$

$$S_{YX} = S_Y \cdot \sqrt{1-r^2} = 12 \cdot \sqrt{1-.64^2} = 12 \cdot \sqrt{1-.410} = 9.216$$

72.00 ± 9.216 points is the predicted life satisfaction score for someone 50 years of age.

$$9. \hat{Y} = bX + a = .853(30) + 29.351 = 25.59 + 29.351 = 54.941$$

$$S_{YX} = S_Y \cdot \sqrt{1-r^2} = 12 \cdot \sqrt{1-.64^2} = 12 \cdot \sqrt{1-.410} = 9.216$$

54.941 ± 9.216 points is the predicted life satisfaction score for someone 30 years of age.

$$10. \hat{Y} = bX + a = .853(60) + 29.351 = 51.18 + 29.351 = 80.531$$

$$S_{YX} = S_Y \cdot \sqrt{1-r^2} = 12 \cdot \sqrt{1-.64^2} = 12 \cdot \sqrt{1-.410} = 9.216$$

80.531 ± 9.216 points is the predicted life satisfaction score for someone 60 years of age.

