1. Suppose X is a random variable with $E[X] = 4$. Find $E[3 + 2X]$.

A) 8 B) 20 C) 11 D) 4

2. Suppose X is a random variable with $\text{Var}(X) = 5$. Find $\text{Var}(2 - 3X)$.

A) 45 B) 15 C) -15 D) 47

3. Suppose X is a random variable with standard deviation $\text{Stdev}(X) = 6$. Find the standard deviation of $Y = 10 - 4X$.

A) 96 B) -24 C) 30 D) 24

4. Suppose X and Y are random variables with $\text{Cov}(X, Y) = 8$. Find $\text{Cov}(3X,\ 2Y + 5)$.

A) 53 B) 48 C) 24 D) 40

5. Suppose X and Y are random variables with correlation $\text{Corr}(X, Y) = 0.6$. Find $\text{Corr}(2X + 3,\ -5Y + 1)$.

A) 0.6 B) 0 C) -0.6 D) -3.0

6. A sample has linear correlation coefficient $r = 0.8$, with $s_X = 2$ and $s_Y = 5$. Find the slope b_1 of the regression line.

A) 2.0 B) 0.32 C) 2.5 D) 8

7. A sample has linear correlation coefficient $r = -0.6$. Find the coefficient of determination R^2.

A) 0.6 B) 0.36 C) -0.36 D) -0.6

8. For a regression line, the slope is $b_1 = 3$, with $\bar{x} = 4$ and $\bar{y} = 20$. Find the intercept b_0.

A) 32 B) 12 C) 8 D) -8

9. A sample has $r = 0.5$, $s_X = 4$, and $s_Y = 6$. Find $\text{cov}(x, y)$.

A) 24 B) 0.75 C) 2 D) 12

10. A sample has $\text{cov}(x, y) = 10$, $s_X = 5$, and $s_Y = 4$. Find the linear correlation coefficient r.

A) 0.5 B) 0.4 C) 2 D) 0.1

11. A sample has $\bar{x} = 3$, $\bar{y} = 10$, $r = 0.9$, $s_X = 3$, and $s_Y = 6$. Find the equation of the regression line $\hat{y} = b_0 + b_1 x$.

A) $\hat{y} = 10 + 1.8x$

B) $\hat{y} = 1.8 + 4.6x$

C) $\hat{y} = 4.6 + 1.8x$

D) $\hat{y} = 4.6 + 0.9x$

12. A sample of size $n = 26$ has $s_Y = 2$ and linear correlation coefficient $r = 0.8$. Find the residual sum of squares (RSS).

A) 64 B) 100 C) 36 D) 0.36

13. For a sample regression in which x and y have a **negative** association, the residual sum of squares is RSS $= 18$ and the total sum of squares is TSS $= 50$. Find the linear correlation coefficient r.

A) 0.8 B) -0.8 C) -0.64 D) -0.36

14. A sample of size $n = 17$ has explained sum of squares ESS $= 108$ and residual sum of squares RSS $= 36$. Find the sample standard deviation s_Y.

A) 3 B) 9 C) 12 D) 0.75

15. A least-squares regression line $y = b_0 + b_1 x$ is fit to a sample of $n = 12$ data points, producing

$$b_1 = 1.2, \qquad \text{RSS} = 40, \qquad \sum (x_i - \bar{x})^2 = 25.$$

At the $\alpha = 0.05$ significance level, test the claim that $\beta_1 \neq 0$. Assume that the error term has constant variance and is normally distributed.

Step 1. State the hypotheses.

$H_0: \ \beta_1$ __________ $H_1: \ \beta_1$ __________

Step 2.

Step 3.

$df = n - 2 =$ _______________

$$s_e = \sqrt{\frac{\text{RSS}}{df}} = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_$$

$$s_{b_1} = \frac{s_e}{\sqrt{\sum (x_i - \bar{x})^2}} = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_$$

Test statistic: $t = \dfrac{b_1 - 0}{s_{b_1}} =$ ____________________

Critical value(s): ______________________

Step 4.

Step 5. Conclusion: