

CP Statistics – Chapter 3 Practice Test – Free Response

Show all necessary work on the answer sheet. Write clearly and completely

1. Bacteria are placed in a petri dish and their numbers are counted at various time intervals. The formula for the number of bacteria (y) as a function of the time (x , in hours) is given by the equation

$$y = 80 + 35x.$$

- Explain the meaning of the y -intercept of this equation in a sentence.
 - Explain the meaning of the slope of this equation in a sentence.
 - How long until the number of bacteria reaches 500?
2. A group of 10 students was selected at random and asked for their high school GPA and their freshmen GPA in college the subsequent year. The results are shown in the table below.

Student	1	2	3	4	5	6	7	8	9	10
High School GPA (x)	2.0	2.2	2.6	2.7	2.8	3.1	2.9	3.2	3.3	3.6
Freshman GPA (y)	1.6	2.0	1.8	2.8	2.1	2.0	2.6	2.2	2.6	3.0

Summary statistics for this data were calculated as follows:

$$\bar{x} = 2.84 \quad s_x = .493 \quad \bar{y} = 2.27 \quad s_y = .457 \quad r = .697$$

- Find the slope of the linear regression equation for this data.
 - Find the y -intercept of the linear regression equation for this data.
 - Use your results to predict the freshman GPA for a student with a 3.0 high school GPA.
3. The cost of catering a meal for a dinner party for x number guests is shown in the table below. The cost includes a basic setup charge plus a per person charge for the meal.

Guests (x)	1	2	3	4	5
Total Cost (y)	90	105	120	135	150

- Find the per person charge for a meal.
- Find the basic setup charge for catering this meal.
- Write a linear equation for the cost (y) based on the number of guests.
- What would be the total cost for 12 guests?

CP Statistics – Chapter 3 Practice Test – Free Response - SOLUTIONS

1. Bacteria are placed in a petri dish and their numbers are counted at various time intervals. The formula for the number of bacteria (y) as a function of the time (x , in hours) is given by the equation

$$y = 80 + 35x.$$

- a) At the beginning of the experiment (time=0), there were 80 bacteria in the petri dish.
b) On average, the number of bacteria is growing by 35 per hour.
c) Let $y = 500$ and solve for x .

$$500 = 80 + 35x, \text{ so } 420 = 35x \text{ and } x = 12 \text{ hours.}$$

2. A group of 10 students was selected at random and asked for their high school GPA and their freshmen GPA in college the subsequent year. The results are shown in the table below.

Student	1	2	3	4	5	6	7	8	9	10
High School GPA (x)	2.0	2.2	2.6	2.7	2.8	3.1	2.9	3.2	3.3	3.6
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Summary statistics for this data were calculated as follows:

$$\bar{x} = 2.84 \quad s_x = .493 \quad \bar{y} = 2.27 \quad s_y = .457 \quad r = .697$$

a) $b = r \cdot \frac{S_y}{S_x} = .697 \cdot \frac{.457}{.493} = .646$

b) $a = \bar{y} - b \cdot \bar{x} = 2.27 - .646 \cdot 2.84 = .435$

c) So $y = .435 + .646x$ and here, $x = 3.0$

$$\text{So } y = .435 + .646(3.0) = 2.373$$

3. The cost of catering a meal for a dinner party for x number guests is shown in the table below. The cost includes a basic setup charge plus a per person charge for the meal.

Guests (x)	1	2	3	4	5
Total Cost (y)	90	105	120	135	150

- a) The increase from 1 guest to 2 guests is $105 - 90 = 15$. So the per person cost is \$15.
b) Since 1 guest will cost \$90 and the meal is \$15, the setup charge is $90 - 15 = \$75$.
c) The equation is $y = 75 + 15x$
d) $y = 75 + 15(12) = \$255$