

Math 480 HW 5 2022. Due Wed. Oct. 5. Q5 on Friday, Oct. 7, is like HW5. Final Wed., Dec. 14, 2:45-4:45.

1) The “adhesion” of a train follows a normal distribution with mean 0.37 and standard deviation SD 0.04.

- a) What proportion of adhesions are higher than 0.40?
- b) What proportion of adhesions are between 0.40 and 0.50?
- c) Suppose an improved train has adhesion that follows a normal distribution with mean 0.41 and SD 0.02.

- i) What proportion of adhesions are higher than 0.40?
- ii) What proportion of adhesions are between 0.40 and 0.50?

comment Answers near 0.2 and 0.7.

2) IQ scores are approximately normally distributed with mean $\mu = 100$ and standard deviation $\sigma = 15$.

- a) What IQ scores fall in the lowest 25% of the distribution?
- b) How high an IQ score is needed to be in the highest 5%?

comment backwards: Draw the Z curve 1st, find z^* , then solve for x^* . Answers near 90 and 125.

3) The heights of women aged 20 to 29 are approximately $N(64, (2.7)^2)$ so the SD $\sigma = 2.7$. Men of the same age have heights approximately $N(69.3, (2.8)^2)$ so the SD $\sigma = 2.8$. What percent of young women are taller than the mean height of young men?

comment See comment for 1). Want $P(X > 69.3)$ which is near 0.02.

4) The lower and upper deciles are points that mark off the lowest 10% and highest 10%. On a pdf, these are the points with areas 0.1 and 0.9 to the left under the curve. What are the lower and upper deciles of the $N(64, (2.7)^2)$ distribution?

comment See comment for 2).

5) Suppose that the joint probability function $p(y_1, y_2)$ of Y_1 and Y_2 is and is tabled as shown.

$p(y_1, y_2)$		y_2			
		1	2	3	4
y_1	1	0.062	0.192	0.176	0.210
	2	0.006	0.011	0.008	0.006
	3	0.083	0.115	0.070	0.061

- a) Find the marginal probability function $p_{Y_1}(y_1)$ for Y_1 .
- b) Find $E(Y_1)$.
- 6) Suppose that the joint pdf of the random variables Y_1 and Y_2 is given by

$$f(y_1, y_2) = \begin{cases} c y_1 y_2, & \text{if } 0 \leq y_1 \leq 1, 0 \leq y_2 \leq 3 \\ 0, & \text{otherwise.} \end{cases}$$

- a) Find c .
- b) Find the marginal pdf of Y_1 . Include the support.
- c) Find $E(Y_1)$.

7) Suppose $Y \sim \text{geometric}(0.5)$.

a) Find $E(Y)$.

b) Find $V(Y)$.

c) Find $P(Y = 2)$.

Hint: Page 2 of the exam 1 review is useful.

8) Suppose $Y \sim \text{EXP}(2)$.

a) Find $E(Y)$.

b) Find $V(Y)$.

c) Find $P(Y > 2)$.

Hint: Page 1 of the exam 1 review is useful.

9) Suppose $Y \sim U(0, 10)$.

a) Find $E(Y)$.

b) Find $V(Y)$.

c) Find $P(Y > 2)$.

Hint: Page 1 of the exam 1 review is useful.

10) Suppose $Y \sim \text{Gamma}(\alpha = 2, \lambda = 2)$.

a) Find $E(Y)$.

b) Find $V(Y)$.

Hint: Page 1 of the exam 1 review is useful.