

Econ 103 – Quiz 2

Name: _____

Instructions: This is closed-book, closed-notes quiz. Please write your answers in the blanks provided.

1. (7 points) Let X be a discrete random variable denoting the number of days it will rain within a 2 day interval and Y denotes the number of days it will snow. The following table represents the joint PMF of X and Y denoted by $P(X, Y)$.

		Y		
		0	1	2
X	0	$1/20$	$2/20$	$4/20$
	1	$5/20$	$1/20$	$3/20$
	2	$1/20$	$2/20$	$1/20$

Calculate (1 point each for 1-3. 2 points for 4-5.):

1. The probability that it will rain on one day only.
2. The probability that it will snow on one day only.
3. The probability that it will rain on one day only and it will snow on one day only.
4. The probability that it will rain on one day only, given that it will snow on one day only.
5. Are the random variables X and Y independent? (State yes/no and justify your answer)

1. _____

2. (1 point) Let X be a random variable with support set $\{2, 3, -1\}$ where $p(2) = p(3) = p(-1)$. Calculate $E[X^2]$

2. _____

3. (3 points) Prove the short cut formula $Var(X) = E[X^2] - (E[X])^2$. (Hint: Use the definition of variance and the linearity of expectation.)

3. _____

4. (3 points) An employer uses a lie detector test to try and figure out which of her employees may be thieves. She knows that 1% of her workers steal from her supply closet. The lie detector test is 90% effective – if a thief takes it, 90% of the time they will fail the test, and if an honest employee takes it, they will *pass* 90% of the time. What is the probability that an employee is a thief given that he failed the test?

4. _____

5. (2 points) A six sided fair die is randomly rolled 3 times. What is the probability **in fraction** that you get at least one 6?

5. _____

6. (1 point) Expected value of function (of random variable) is equal to function of expected value. True or false?

6. _____

7. (1 point) Random variable is variable. True or false?

7. _____

8. (1 point) A and A^C are mutually exclusive and collectively exhaustive. True or false?

8. _____

9. (1 point) $P(A \cap A^C) = 1$. True or false?

9. _____