

SHOW WORK TO GET FULL CREDIT

Fall 2014
MATH-333 (Common Exam. #2)

November 12, 2014
NJIT

Q. # 1	#2	#3	#4	#5	#6	#7	#8	Total
12	12	14	12	14	12	12	12	100

Name (PRINT) _____ Last First	Section # _____
----------------------------------	-----------------

Instructors: Egbert Ammicht, George Mytalas, Padma Natarajan, Jonathan Porus

Problem 1) Volcanic eruptions of Mt. Vesuvius follow a Poisson distribution with an average of 2.5 eruptions every 100 years. Use that to answer the following:

a) Find the probability that there will be exactly 3 eruptions in the next 200 years. (6 points) (Round your answer to 4 decimal places)

b) Find the probability the next eruption occurs between 25 and 50 years. (6 points) (Round your answer to 4 decimal places)

SHOW WORK TO GET FULL CREDIT

Problem 2) Suppose that a certain random variable, X , has the following cumulative distribution function:

$$F(x) = \begin{cases} 0, & x < 0 \\ \frac{1}{8}x^3, & 0 \leq x \leq 2 \\ 1, & x > 2 \end{cases}$$

i) Find $P(X > 1)$ (6 points)

ii) Find $E(X)$, the expected value of this random variable X . (6 points)

SHOW WORK TO GET FULL CREDIT

Problem 3) The CPU of a personal computer has a lifetime that is exponentially distributed with a mean lifetime of six years.

a) What is the probability that the CPU fails within three years? (6 points) (Round your answer to 4 decimal places)

b) Assume that your corporation owned 10 CPUs, and assume that the CPUs fail independently. What is the probability that at least one fails within three years? (8 points) (Round your answer to 4 decimal places)

SHOW WORK TO GET FULL CREDIT

Problem 4) Studies show that gasoline use for compact cars sold in the United States is normally distributed with a mean use of 25.5 miles per gallon and a standard deviation of 4.5 miles per gallon.

a) What percentage of compacts obtains 30 or more miles per gallon? (6 points)

b) If a manufacturer wishes to develop a compact car that outperforms 97.5% of the current compacts in fuel economy, what must be gasoline use for the new car? (6 points)

SHOW WORK TO GET FULL CREDIT

Problem 5) (Note that a) and b) are separate problems) (Round your answer to 4 decimal places)

a) In a test for particular illness, a false-positive result is obtained about 1 in 125 times the test is administered. If the test is administered to 15000 people, obtain the approximate probability of there being more than 135 false-positive results? (8 points)

b) The manufacturer of a new compact car claims the miles per gallon (mpg) for the gasoline consumption is approximately normal with mean 26 mpg and standard deviation 12 mpg. If a random sample of 36 such cars are chosen and tested, what is the probability the average mpg is less than 28 mpg? (6 points)

SHOW WORK TO GET FULL CREDIT

Problem 6) (Note that a) and b) are separate problems)

a) The net weight in pounds of a packaged chemical herbicide is uniform for $49.62 < x < 50.12$ pounds. What is the probability that the net weight is greater than 49.9 pounds? (6 points)

b) Assume that the heights of boys in a high school basketball tournament are normally distributed, with mean 70 inches and standard deviation 2.5 inches. What is the expected number of boys in a group of 40 who are taller than 70 inches? (6 points)

SHOW WORK TO GET FULL CREDIT

Problem 7) Suppose that a certain random variable, X , has the following cumulative distribution function:

$$F(x) = \begin{cases} 0 & x < 1 \\ 0.7 & 1 \leq x < 4 \\ 0.9 & 4 \leq x < 7 \\ 1 & x \geq 7 \end{cases}$$

i) Determine $P(X > 1)$ (6 points)

ii) Determine $P(4 \leq X \leq 6)$ (6 points)

SHOW WORK TO GET FULL CREDIT

Problem 8) (Note that a) and b) are separate problems)

a) The probability that a computer running a certain operating system crashes on any given day is 0.1. Assume that the computer crashes are independent. What is the probability that the computer crashes for the first time on the tenth day after the operating system is installed. (6 points) (Round your answer to 4 decimal places)

b) Let X denote a random variable that takes on any of the values $-1, 0, 1$ with respective probabilities

$$P(X = -1) = 0.2$$

$$P(X = 0) = 0.5$$

$$P(X = 1) = 0.3$$

Compute $E(X^2)$ (6 points)

SHOW WORK TO GET FULL CREDIT

Extra Space (ANY "Rough Work" must be crossed out)
