Sections #5 and #6

(1) An electronics firm manufactures a certain type of computer microchip, which according to specifications has an operational capacity with a mean of 100 MHz and a standard deviation of 15 MHz. Indicate which of the following is the percentage of the microchips that have an operational capacity greater than 79 MHz (to 2 significant digits).

a. 92%
b. 8.0%
c. 84%
d. 74%
e. None of the above

(2) A large shovel at an open pit mine picks up an average of 9.4 m^3 per scoop. Assume the volume of the scoop is normally distributed with a standard deviation of 2.0 m^3. What is the probability of a scoop exceeding 12 m^3? (three significant digits)

a. 0.995
b. 0.00471
c. 0.903
d. 0.0968
e. None of the above

(3) Suppose that the lifetime of television tubes is normally distributed. A study of the output of one manufacturer shows that 15% of tubes fail before 2 years, while 5% last longer than 6 years. Find the variance of the lifetime distribution to two digits after the decimal.

a) 0.67
b) 0.45
c) 2.22
d) 1.49
e) None of the above

(4) A switchboard at a consultant's office receives, on average, 0.9 calls per minute. What is the probability that the time between two successive calls will exceed 3 minutes, to three digits after the decimal?

a) 0.933
b) 0.964
c) 0.067
d) 0.036
e) None of the above

(5) A survey of construction workers indicates that 35% wear their helmets during lunch at work. Assuming this is true, what is the probability that 3, 4 or 5 workers in a group of 6 are wearing helmets?

a) 0.256
b) 0.351
c) 0.452
d) 0.146
e) None of the above

(6) A retail store has ten computers of a particular brand, out of which four are defective. If a person makes a random purchase of two of the ten computers, find the probability that exactly one of the purchased computers is defective.

a) 8/9
b) 2/15
c) 8/15
d) 5/10
e) None of the above

(7) The lifespan of a electrical bulb is a random variable with cumulative distribution function

$$F(x)=\begin{cases}1-e^{\frac{-x}{40}} & x>0\\ 0 & elsewhere\end{cases}$$

What is the probability that the lifespan of the bulb will exceed 75 hours?

a) 0.15
b) 0.30
c) 0.45
d) 0.55
e) None of the above

(8) There are 13 hearts, 13 diamonds, 13 spades and 13 clubs in a deck of playing cards. What is probability of being dealt a bridge hand of 13 cards containing 5 spades, 2 hearts, 3 diamonds and 3 clubs?

a. 0.013
b. 0.014
c. 0.025
d. 0.026
e. None of the above

(9) For the LotoLoto Lottery, five extra prizes were added. The five prizes were won by five different people. Each winner can select an all-expense paid trip to one of three destinations. Independently of each other, winners select destinations 1, 2 or 3 with probabilities 0.5, 0.3 and 0.2, respectively. What is the probability that exactly 1 person selects destination 2 and exactly one person selects destination 3, or that exactly two people select destinations 2 and exactly two people select destination 3.

a. 0.204
b. 0.261
c. 0.291
d. 0.321
e. None of the above

(10) An archer hits a bull's-eye with a probability of 0.09, and misses the target completely with a probability of 0.12. If the archer shoots eight arrows whose performance are independent of each other, calculate the probability of scoring at least two bull's-eyes.

(a) 0.1111
(b) 0.1254
(c) 0.1577
(d) 0.2781
(e) None of the above