Review Exercises for
Finite Mathematics
Finite Mathematics & Applied Calculus
Topic: Random Variables and Statistics

1. When Justin is goal-keeper, Shaunie manages to score an average of once for every 10 shots he takes. If Shaunie takes 12 shots, find the following probabilities:

(a) He scores exactly twice.

(b) He scores at most twice.

(c) He scores at least three times.

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2. Calculate the mean, median, and (sample) standard deviation of the following collection of scores:

2, 5, 6, 8, −1, −5

(Round all answers to four decimal places, enter them in the spaces provided.)

$\bar{x} =$

median =

standard deviation =

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3. Julian's transcript shows a grade point average of 3.00, with a standard deviation of 0.25. What fraction of his total credits were certain to have a grade point average between 2.00 and 4.0?

(Enter the answer as either a fraction or decimal.)

Answer:

4. The average value of mortgage loans in 1989 was $120,000 with a standard deviation of $40,000, distributed according to a normal distribution.

(a) You would like to state in your annual report that at least 95% of all mortgage loans were in a certain range. What is that range?

Lower Limit: $ [   ]
Upper Limit: $ [   ]

(b) Complete the following sentence:

At most [   ]% of mortgage loans are lower than $80,000.

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5. A survey of 50 Grand University soccer players reveals the following injury pattern last season.

Injuries Suffered During the Season	0	1	2	3	4
Number of Players	17	20	10	2	1

(a) If X denotes the number of injuries encountered by a randomly selected player during one season, complete the following (experimental) probability distribution for X.

x	0	1	2	3	4
P(X = x)	[ ]	[ ]	[ ]	[ ]	[ ]

(b) The expected value is $\mu =$ [   ]

6. Your company, Sonic Video Inc., has conducted research which shows the following frequency distribution of video stores in a randomly chosen Nassau County City.

Video Stores	0	1	2	3	4	5
Number of Cities	0	5	5	15	10	15

(a) If X is the number of video stores in a randomly chosen Nassau County City, find the probability distribution for X, and hence compute the expected value μ of X, and standard deviation σ. (Round answers to 4 decimal places.)

$\mu =$ [____]

$\sigma =$ [____]

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7. Your Internet commerce company, ShadySlim.com, sells beauty products on-line. Recent research shows the number of orders in one month per million residents in 100 cities around the US.

Orders	2	4	6	8	10
Number of Cities	25	35	15	15	10

(a) If X is the number of orders per million residents in a randomly chosen city, construct the probability distribution for X in tabular form, and hence compute the expected value μ of X, and standard deviation σ (Round answers to 4 decimal places.)

$\mu =$ [____]

$\sigma =$ [____]

(b) What range of orders per million residents does the empirical rule predict from approximately 68% of all cities? (Give answers accurate to 1 decimal place.)

Between [____] and [____] orders per million residents

(c) Referring to the frequency distribution, the actual percentage of cities from which you obtain between 2.4 and 7.6 orders per million residents is [____].

8. You have calculated that there is a 20% chance that a hit on your web page results in a fee paid to your company CyberPromo, Inc. Your web page receives 25 hits per day. Let X be the number of hits that result in payment of the fee.

(a) Find the following, correct to three decimal places:

$P(X \leq 5) = $ [   ]

$P(X \geq 5) = $ [   ]

$P(X = 5) = $ [   ]

(d) What is the average number of payments you expect to receive? What is the standard deviation of X?

Expected Number of
Payments = [   ]

Standard Deviation = [   ]

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9. Manufacturer data shows that the average lifespan of a Gomobile is 20 years, with a standard deivation of 2.5 years. Further, the distribution is symmetric, but not normal. Your Gomobile is now 30 years old. What percentage of all Gomobiles have enjoyed a lifespan at least as long as yours? Your answer should be in the following form: "At least ___%" or "At most ___%" (Only one choice is correct!)

at least
at most [   ] %

10. Let Z be the standard normal distribution. Use a Normal Distribution Table to compute the following probabilities.

(a) $P(0 \le Z \le 1.5) =$ [   ]

(b) $P(Z \le -1.5) =$ [   ]

(c) $P(|Z| \ge 2.1) =$ [   ]

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11. IQ scores (as measured by the Stanford-Binet intelligence test) are normally distributed with a mean of 100 and a standard deviation of 16. Find the probabilty that someone has an IQ higher than 120.

[   ]

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12. Given the IQ data in the preceeding question, what would your IQ have to be if you were in the top 3% of the population? (Round your answer to the nearest whole number.)

[   ]