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

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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.

0.23012

- (b) He scores at most twice.

0.88913

- (c) He scores at least three times.

0.11087

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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.)

$\bar{x} =$  2.5

median = 3.5

standard deviation = 4.8477

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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: 0.9375

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: \$40000

Upper Limit: \$200000

(b) Complete the following sentence:

At most 16 % of mortgage loans are lower than \$80,000.

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
$P(X = x)$	0.34	0.4	0.2	0.04	0.02

(b) The expected value is  $\mu = 1$

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  $\mu$  of  $X$ , and standard deviation  $\sigma$ . (Round answers to 4 decimal places.)

$$\mu = 3.5$$

$$\sigma = 1.2845$$

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  $\mu$  of  $X$ , and standard deviation  $\sigma$  (Round answers to 4 decimal places.)

$$\mu = 5$$

$$\sigma = 2.5690$$

(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 2.4 and 7.6 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 at most 90%.

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:

$$P(X \leq 5) = 0.617$$

$$P(X \geq 5) = 0.579$$

$$P(X = 5) = 0.196$$

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

Expected Number of  
Payments = 5

Standard Deviation = 2

9. Manufacturer data shows that the average lifespan of a Gomobile is 20 years, with a standard deviation 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 most 3.125 %

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

(a)  $P(0 \leq Z \leq 1.5) =$

(b)  $P(Z \leq -1.5) =$

(c)  $P(|Z| \geq 2.1) =$

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 probability that someone has an IQ higher than 120.

12. Given the IQ data in the preceding 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.)