## Advanced Functions and Modeling Probability Review

1. How many area codes are possible if an area code is three digits long, the first digit must be a number 2 through 9, the second number must be a one or zero, and the  $3^{rd}$  number can be any digit 0-9?

2. A North Carolina general license plate for an automobile consists of a total of three letters and four numbers. How many possible ways can a NC license plate be created?

3. If you flip two coins, what is the probability of flipping 1 head and 1 tail?

4. In a standard deck of 52 cards, what is the probability you will select a Queen and then a 4 of diamonds if there is no replacement?

#### Use for Questions 5-7

The chart below shows the eight states in the United States with the greatest number of hazardous waste sites.

State	Total
New Jersey	120
Pennsylvania	110
California	94
New York	82
Michigan	75
Florida	57
Washington	42
Illinois	40

5. If **one state** from the list is selected at random, determine the probability the state has exactly 80 hazardous waste sites.

6. If **one state** from the list is selected at random, determine the probability the state has greater than 80 hazardous waste sites.

7. If **one site** from the list is selected at random, determine the probability the site is from Florida.

#### Use for Questions 8-9:

A basketball player is deemed a 47% shooter. Assuming he or she will take 2 free throws, answer the following questions:

8. What is the probability the shooter will make zero free throws?

9. What is the probability the shooter will make both free throws?

10. How many ways can you arrange a class of 29 students into 4 groups?

11. How many ways can you arrange a baseball team with 12 players into a line-up consisting of 9 players?

- 12. If using a standard 52 card deck, what is the probability you draw a 2 or a heart?
- 13. An experiment consists of tossing a coin three times. Find the sample space. (head = h, tails = t)

#### Advanced Functions and Modeling Exam Review Sheet

- 1. Correlation coefficient:
- 2. Residual value:

3. Residual graphs and patterns:

Answer the following questions based on this fictional data: (4 - 8)

Hours of Study	Test Score
0.25	70
0.5	76
0.75	79
1.00	83
1.25	87
1.50	92
1.75	96

4. The model for this data is:

- 5. What can we predict a person's test score to be if they studied for a third of an hour?
- 6. How much time did a person study if they received a 96.771?
- 7. The graph of the residuals can be described as:
- 8. Which of the following describes a situation that has a linear relationship?
  - a. \$1000 in a savings account that accrues interest twice a month.
  - b. An hourly paying job.
  - c. The population of a new nation.
  - d. The popularity of a movie over 10 years
- 9. The phase shift for the function  $y = \sin(x \frac{\pi}{4}) + 2$  is

10. The vertical shift for the function  $y = -2\cos(x + \pi) - 2$  is

11. The period for the function  $y = 2\cos(2x) + 2$  is

12. The amplitude for the function  $y = -\frac{1}{2}\sin x + 2$  is

13. From one point on the ground, the angle of elevation of the peak of a mountain is 10.38 degrees, and from a point 15,860 ft closer to the mountain, the angle of elevation is 14.67 degrees. Find the height of the mountain.

14. Given angle C to be 90° and angle B to be 29° and length of side c is 14 units, find the length of side a.

15. Find the Cosecant of a 210° angle.

16. Find the exact value for the cosine function of the angle  $\theta$  in standard position if the point (3,4) is on the terminal side of the angle.

17. An angle is rotated clockwise  $\frac{1}{4}$  th a rotation. Find the degree measure of the angle.

18. Which of the following angles is coterminal to an angle measuring -100°?

- 1. Find the vertex of  $-2x^2 + x 3 = f(x)$
- 2. Find the root(s) of  $3x^{2} + x 4 = f(x)$ .

## Use for questions 3-5.

A projectile is fired at an inclination of 45 degrees to the horizontal, with a muzzle velocity of 200 feet per second. The height h of the projectile is given by:

$$h(x) = \frac{-32x^2}{(200)^2} + x$$
, where x is the horizontal distance of the projectile from the firing point

(window hint: 0<x<1500, 0<y<400).

- 3. What is the highest point the projectile will reach?
- 4. A person is standing 1250 feet from the firing point. Will this person be hit by the projectile?
- 5. When the height of the projectile is 60 feet above the ground, how far has it traveled horizontally?
- 6. What is the largest rectangular area that can be enclosed with 800 feet of fencing?

## Use for Questions 7-12

Describe the polynomial function:

$$f(t) = t^3 - 2t^2 - 19t - 10$$
 (window hint: -10

- 7. What is the domain of the function?
- 8. What is the range of the function?
- 9. What are the factors of the function?
- 10. The local max(s) is/are:
- 11. The local min(s) is/are:
- 12. If asked to solve for *t*, how many solutions would you anticipate?

## Determine if the following situation is precise, accurate, both, or neither.

- 13. A baseball player strikes out 3 times in a row.
- 14. A baseball player hits 3 homeruns in a row to the same fan in the outfield.
- 15. The weatherman predicts four days of rain. It never rains.
- 16. The last 3 quiz grades for a student are 82, 81, 82. They hope to make a 93 on their quiz average.

Use the fictional data to answer the following questions: 3,3,4,1,4,1,4,2,4,4,4,4,4,6,4,6,4,6,4,6,4,8,5,5,5,1,5,3,5,3,5,4,5,5,6

- 17. What is the mean of the data?
- 18. What is the mode of the data?
- 19. What is the median of the data?
- 20. What is the range of the data?
- 21. What is the lower quartile of the data?
- 22. What is the upper quartile of the data?
- 23. What is the Inner Quartile Range?
- 24. Create a box plot for the data.

# Advanced Functions and Modeling

**Exponential Functions** 

- 1. Describe the transformation of  $f(x) = e^{-x}$ .
- 2. Describe the transformation of  $f(t) = -(e^{t+3})$
- 3. State the domain of  $f(x) = 3 3^{x+2}$
- 4. State the range of  $f(x) = -(2^x)$
- 5. State the *y*-intercept of  $f(x) = e^{x+2} + 3$
- 6.. Solve  $3^x = 33$
- 7. Solve  $2^{x^2+x} = 1$ .

8. A model for the number of people N at Athens Drive who have heard a rumor is  $N = P(1 - e^{-0.15d})$ . *P* stands for population and *d* stands for days. Using the population of Athens Drive (1700), how many people have not heard the rumor after 5 days?

Use the following information to answer the following questions:

Year	\$\$\$\$\$
1988	20,000
1989	21,516
1990	23,355
1991	24,885
1992	27,434
1993	30,053
1994	32,622

- 9. What model fits this data best?
- 10. Find the prediction model for this data.
- 11. Predict the value in 1996.
- 12. What year will this person have \$86,776