AFM - Final Exam Review

Functions:

Solve each equation. Remember to check for extraneous solutions.

1) $\dfrac{1}{a} - \dfrac{1}{a^2 - 5a} = \dfrac{4}{a^2 - 5a}$

2) $\dfrac{2}{p^2 - 2p + 1} = \dfrac{6}{p - 1} - \dfrac{1}{p^2 - 2p + 1}$

3) $\dfrac{n + 5}{n} + \dfrac{5n - 30}{n^2 - n} = 1$

4) $\dfrac{1}{n^2 - 3n} = \dfrac{6n + 1}{n - 3} - 1$

Solve each equation.

5) $\log_{11} 5v = \log_{11}(3v + 9)$

$V = \dfrac{9}{2}$

6) $\log_{16}(v^2 + 2v) = \log_{16}(54 - v)$

$V = -9, 6 .$

7) $\log_7(x + 1) + \log_7 x = \log_7 20$

$x = 4, -5$

8) $\log_2(x - 4) - \log_2 7 = 3$

$x = 60$

9) $7.1e^{x + 7} = 20$

$x = -5.9664$

10) $4^{9x - 6} + 1 = 9.2$

$x = .8353$

11. Given the function: $f(x) = \begin{cases} 2x - 5 \text{ if } x \le 1 \\ 4 - 3x^2 \text{ if } x > 1 \end{cases}$

Find: $f(4) + 2f(-3) - 5f(1) = -51$

Sequences & Series:

12. For the following arithmetic sequence, find the 18th term of 1.4, 1.9, 2.4

$$a_{18} = 9.9$$

13. Find the three arithmetic means between 2 and 5.

$$2, 2.75, 3.5, 4.25, 5$$

14. Find the sum of the first 35 terms of the arithmetic sequence when $a_1 = 5$ and $d = 4$

$$S = 2,555$$

15. Find the sum of the arithmetic series in which $a_1 = 5$ and $a_{34} = 71$

$$S = 1292$$

16. Evaluate: $\sum_{n=1}^{4}(2n - 7)$

$$S = -8$$

17. Find the sixth term of the geometric sequence: $1, \frac{3}{4}, \frac{9}{16},$

$$a_6 = \cancel{496} \frac{243}{1024} = .237$$

18. Find the sixth term of the geometric sequence if $a_1 = 48$ and $r = -2$

$$a_6 = -1536$$

19. Find the 8th term of the geometric sequence when $a_1 = 9$ and $r = -2$

$$a_8 = -1152$$

20. Find the sum of the first five terms of the geometric series: $\frac{1}{3} + 2 + 12 + \cdots$

$$S = 518.33$$

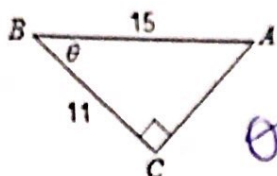21. Find the sum of the infinite geometric series, if it exists. $\sum_{n=1}^{\infty} 2k$

$$\emptyset \quad no \ sum$$

22. Find the sum of the infinite geometric series, if it exists: $20 - 2 + \frac{1}{5} - \cdots$

$$S = 18.18$$
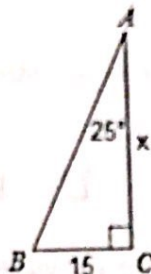
Trigonometry & Triangles:

23. Find the missing side or angle using trigonometry.

a.

B ——15—— A
θ
11
C

$\theta = 42.83°$

b.

A
$25°$ x
B ——15—— C

$X = 32.17$

24. A ramp in a park is 48 feet long and rises 6 feet. Estimate the angle to the nearest tenth that the ramp makes with the ground.

$7.18°$

25. Given triangle ABC with a = 14, A = 40°, and B = 28°, what is the measure of c?

20.19

26. Given triangle ABC with a = 7 cm, b = 9 cm, and c = 14 cm. Find the measure of angle C.

$121.59°$

27. Determine the number of triangles. (Use Law of Sines)

a. $m\angle B = 18°, a = 10 \text{ m}, b = 4 \text{ m}$

$2 \triangle\text{'s}$

b. $m\angle B = 78°, b = 29 \text{ ft}, a = 24 \text{ ft}$

$1 \triangle$

28. In a paintball game, there are only three players left. Darnell and Gunner are on the same side and 20 ft apart. Josh forms an angle of 75° between Gunner and Darnell. Gunner forms a 68° angle between Darnell and Josh. How far is Josh from **both** Darnell and Gunner?

12.44 ft from Gunner

19.2 ft from Darnell

29. Rick and Carl want to plant corn along the edges of a triangular plot of land at the prison. Two of the angles of the triangle measure 95° and 40°. The side between these two angles is 80 feet long.

   a. Find the measure of the third angle.

   $$45°$$

   b. Find the length of the other two sides of the triangle.

   $$a = 72.72 \qquad b = 112.71$$

   c. What is the perimeter of this triangular plot of land?

   $$112.71$$

30. A ship is sighted from two radar stations 43 km apart. The angle between the line segment joining the two stations and the radar beam of the first station is 37°. The angle between the line segment joining the two stations and the beam from the second station is 113°. How far is the ship from the second station?

   $$51.76 \text{ km}$$

31. During a figure skating routine, Jessica and Shannon skate apart with an angle of 15° between them. Jessica skates for 5 meters and Shannon for 7 meters. How far apart are the skaters?
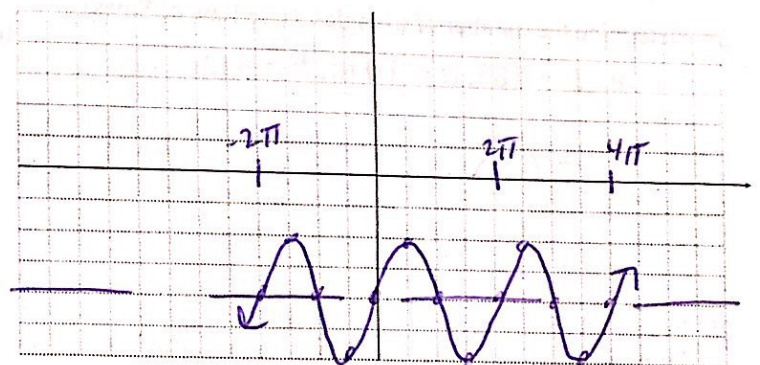
   $$2.527$$

32. Graph $y = 2 \sin \theta - 4$

   $$a = 2$$
   $$p = 2\pi$$
   $$\downarrow 4$$

33. State the amplitude, period, vertical shift, and horizontal shift for: $y = 6 \sin(4\theta) + 5$

   $$a = 6 \qquad \uparrow 5$$
   $$p = \pi/2$$

Statistics:

For questions 19 – 21, use the following information: On a normal curve, the mean on the Algebra II Final is 54, with a standard deviation of 11.8

34. What percent of students are within 2 standard deviations of the mean?

    95%

35. If 120 students took the test, how many scored higher than 65.8?

    19 students

36. What percent scored lower than 54?

    .5 = 50%

Probability:

37. A 9-member committee is selecting a president, vice-president, secretary, and treasurer from the committee. No person can serve in two positions. In how many ways can the four positions be filled?

    3024

38. Teddy is buying a sports car. He can buy red or black, convertible or hard-top, straight drive or automatic. How many possible models does he have to choose from?

    8

39. How many possible ways can you choose 3 library books to check out from 8?

    56

40. How many ways can you arrange 8 candles on the top of a birthday cake?

    40,320

41. How many ways are there to arrange the letters in "Trigonometry"?

    59,875,200

42. How many ways can Mrs. Smith's preschool class of 12 students line-up to go outside and play?

    479,001,600

43. How many groups of 5 students can be chosen from 25?

    53,130

44. How many ways can you choose a group of 5 men and 7 women from 12 men and 13 women?

$$1,359,072$$

45. Suppose you select 3 letters from the word CLEMSON. What is the probability of selecting 2 vowels at the same time?

$$\frac{1}{21} = .0476$$

46. A bag contains 8 orange marbles and 5 purple marbles. If a marble is chosen at a random, what is the probability that it is not purple?

$$\frac{8}{13}$$

47. Billy breaks his piggy bank and finds 5 pennies, 8 nickels, and 9 dimes. What is the probability that he will selection 1 dime and 1 nickel at the same time?

$$\frac{12}{77} \approx .1558$$

48. What is the probability he will select 2 pennies at the same time?

$$\frac{10}{231} = .0433$$

49. A die is thrown twice. What is the probability that a 4 is thrown followed by a 6?

$$\frac{1}{36}$$

For questions 35 – 37, 12 playing cards (3 Aces, 4 Kings, 2 Queens, and 3 Jacks) are placed on the table face down. If four cards are selected at random, find the probability that:

50. You select Ace, Jack, King, King, without replacement.

$$\frac{1}{110} = .0091$$

51. You select a Queen, King, Jack, Ace, with replacement.

$$\frac{1}{72} = .01389$$

52. You select Queen, Queen, Ace, any card other than Ace, without replacement.

$$\frac{7}{864} = .0081$$

Identify the domain of the following functions.

53) $y = 2\sqrt{x+1} - 1$

$x \geq -1$

$[-1, \infty)$

54) $y = \sqrt{3x - 4}$

$x \geq 4/3$

$[4/3, \infty)$

55) $\dfrac{4}{x^2 - 9}$

$(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

56) $\dfrac{3}{x + 2}$

$(-\infty, -2) \cup (-2, \infty)$

Describe the transformations from the parent function $y = x^2$

57) $2(x+3)^2$

- V. stretch by 2
- L 3

58) $-(x+4)^2 - 1$

- Reflect x-axis
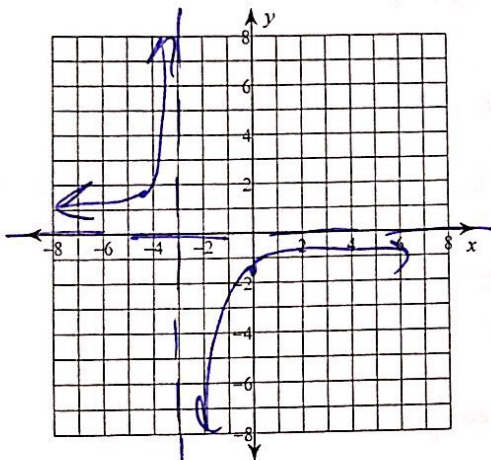- L 4   - ↓ 1

59) $\dfrac{1}{4} \cdot (-x)^2 + 7$

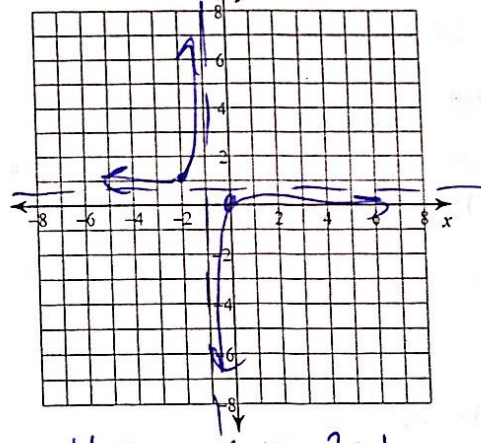- V comp   - ↑ 7
- Reflect y-axis

60) $(3x)^2$

- H comp 1/3

Identify the holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each. Then sketch the graph.

61) $f(x) = -\dfrac{4}{x+3}$

Hole: none
VA: X = -3
HA: y = 0
X-int: none
y-int: $(0, -4/3)$

62) $f(x) = \dfrac{x^2 - 4x}{2x^2 - 6x - 8}$ $\dfrac{x(x-4)}{2(x-4)(x+1)}$

$2(x^2 - 3x - 4)$

Hole: $(4, \frac{2}{5})$
VA: X = -1
HA: y = 1/2
X-int: $(0,0)$
y-int: $(0,0)$

$\dfrac{4}{2(4+1)} = \dfrac{4}{10}$

Mixed Review – Multiple Choice:

53. Find the value of $_6P_4$.

    a) 15

    b) 2

    c) 24

    d) 360

54. Find the standard deviation for the given data: $5, 6, 8, 11, 10$

    a) 3.28

    b) 1.28

    c) 2.28

    d) 4.28

55. Solve: $\frac{x+9}{x+8} = \frac{x-7}{x-6}$

    a) $x = -1$

    b) $x = 0$

    c) $x = 2$

    d). $x = -3$

56. Evaluate: $log_9 729$

    a) 3

    b) 5

    c) 4

    d) 2

57. Evaluate: $log\,94$

    a) 9.4

    b) 1.97

    c) .51

    d) 3.95

58. Solve $e^{4x} = 5.7$ for x to four decimal places.

    a) -0.4030

    b) 0.4351

    c) 0.7559

    d) -0.7559

59. $log_9(x^2 + 7) = log_9(43)$

    a) ± 36

    b) ± 6

    c) ± 6.56

    d) ± 5

60. $\ln(-2y + 5) - \ln(y + 4) = \ln(-11y - 2)$

    a) $(-3.68, -.32)$

    b) infinite solutions

    c) $(3.68, .32)$

    d) no solution

61. Find an exponential function to model the data.

a) $f(x) = 116.4 - 42.8 \ln x$
b) $f(x) = 2.204 (3.56)^x$
c) $f(x) = 3.56(2.04)^x$
d) $f(x) = -42.8 + 116.4 \ln x$

x	y
1	7
2	16
3	30
4	61
5	124
6	271
7	522

62. Find the best fit regression model for the data according to the given model.

x	y
1	50
2	140
3	260
4	400
5	560
6	750
7	925
8	1130

a) $49.79x^{1.50}$
b) $5.48x^{.32}$
c) $156.13x - 175.71$
d) $1.5x + 3.91$

63. What is the explicit form of the equation: $a_1 = a_{n-1} + 2(n-1) \;;\; a_1 = 1$

A $\quad a_n = 2n - 1$

B $\quad a_n = n^2 - n + 1$

C $\quad a_n = n^2 - 2n + 2$

D $\quad a_n = 2n^2 - 2n - 1$

B

64. Which function has an amplitude that is twice the size and a period that is three times the size of the function $y = 3\cos\left(\frac{x}{4} - 1\right) + 2$

A $\quad y = 6\sin\left(\frac{x}{12} - 3\right) + 1$

B $\quad y = \frac{3}{2}\cos\left(\frac{3x}{4} + 1\right) - 3$

C $\quad y = 6\cos\left(\frac{3x}{4} - 1\right) + 3$

D $\quad y = \frac{3}{2}\sin\left(\frac{x}{12} + 3\right) - 1$

$P = \frac{2\pi}{\frac{1}{4}} = 8\pi$

$a = 6$

$P = 24\pi$

$b = \frac{2\pi}{24\pi} = \frac{16}{12}$