AFM Final Exam Review #1 Name Key

1. A home security company offers a security system that uses the numbers 0 through 6, inclusive, for a 3-digit security code. How many different security codes are possible if no digit may be repeated?

1st	2nd	3rd
6	5	4

a) 35 b) 210 c) 20 d) 120

2. Using a standard deck of playing cards, find the probability of randomly selecting a queen, replacing it in the deck, and then selecting a heart.

a) $\frac{1}{26}$ b) $\frac{1}{52}$ c) $\frac{1}{17}$ d) $\frac{1}{4}$

$\frac{4}{52} \cdot \frac{13}{52}$

$\frac{1}{13} \cdot \frac{1}{4} = \frac{1}{52}$

3. Josie has 2 classical, 3 jazz, and 1 folk CD in her car. If she pulls 2 CDs from her CD case without looking, what is the probability that both CDs are jazz?

a) $\frac{1}{5}$ b) $\frac{1}{15}$ c) $\frac{1}{3}$ d) $\frac{1}{4}$

$\frac{3}{6} \cdot \frac{2}{5} = \frac{6}{30} = \frac{1}{5}$

4. A bag contains 2 yellow, 4 blue, and 3 white marbles. What is the probability that a marble selected at random will not be blue?

a) $\frac{2}{3}$ b) $\frac{2}{9}$ c) $\frac{4}{9}$ d) $\frac{5}{9}$

5. Find the number of distinguishable permutations using the letters from the word ROBMURRO.

a) 13,440 b) 3360 c) 40,320 d) 5040

$\frac{8!}{3!2!}$

6. A committee composed of 4 men and 3 women is to be selected from a group of 20 men and 16 women. How many different committees can be formed?

a) 2,074,800 b) 3840 c) 2,713,200 d) 6840

$_{20}C_4 \cdot {}_{16}C_3$

7. How many ways can 5 digits on a license plate be arranged if the first digit cannot be 0? (digits can repeat)

a) 90,000 b) 100,000 c) 30,240 d) 45360

1st	2nd	3rd	4th	5th
9	10	10	10	10

8. Two cards are chosen from a deck of 52 cards. What is the probability that the first card is a heart and the second card is a black face card?

$\frac{13}{52} \cdot \frac{6}{52} = .029$ or $\frac{3}{104}$

9. From a standard deck of 52 cards, a card is dealt. What is the probability that a red card or an ace is drawn?

$\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = .538$ or $\frac{7}{13}$

10. Joe gets $2 if a coin shows up heads and $1 if it shows up tails. What is his expected value?

a) $1.00 b) $1.25 c) $1.32 d) $1.50

H	$\frac{1}{2}$	$2
T	$\frac{1}{2}$	$1

$(\frac{1}{2})(2) + (\frac{1}{2})(1)$

11. For the data set {3, -5, 7, 4, 8, 2, 11, -3, -6}, find the 5-number summary.

a) minimum = -6, median = 3, maximum = 11, range = 17, mean = 2.33
b) minimum = -6, maximum = 11, mean = 2.33, median = 3, mode = none
c) minimum = -6, lower quartile = -4, median = 3, upper quartile = 7.5, maximum = 11
d) lower quartile = -4, upper quartile = 7.5, mean = 2.33, minimum = -6, maximum = 11

2nd Stat
Enter
Put data in L_1
2nd Stat
Over to Calc
Opt. 1

12. Use the frequency table to find the mean, median, and mode.

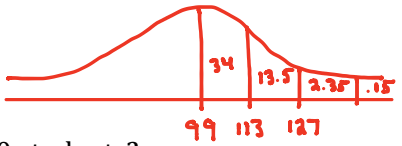
Aptitude Score	1	2	3	4	5
Frequency	2	1	3	5	2

a) mean = 3 b) mean = 3 c) mean = 3.3 d) mean = 3.3
median = 3 median = 4 median = 4 median = 3
mode = none mode = 4 mode = 4 mode = 4

13. Find the range and the interquartile range of the set of values: 37, 21, 44, 19, 22, 47, 26, 32, 25, 43, 11, 15
a) range: 37, interquartile range: 16 b) range: 36, interquartile range: 16
c) range: 36, interquartile range: 20 d) range: 36, interquartile range: 24

14. The lengths of a certain species of fish were found to be normally distributed. The mean length is 99 cm with a standard deviation of 14 cm. In a school of 480 of these fish, about how many would be longer than 127 cm?
a) 65 fish b) 163 fish c) 468 fish d) 12 fish

.0235 + .0015
.025(480)



15. Which method would produce the least biased sample of a school population of 1000 students?
a) One student from each letter of the alphabet b) all the members of faculty are selected.
(by last name) are selected.
c) all the student body officers are selected. d) all the members of the archery club are selected.

$Q_1 = 39$ $Q_3 = 57$ $IQR = 57 - 39 = 18$
$1.5(18) = 27$

16. Identify the outlier of the set of values: 55, 57, 40, 47, 39, 38, 72
a) 47 b) 72 c) 38 d) none of the above

$Q_3 + 27 = 57 + 27 = 84$
$Q_1 - 27 = 39 - 27 = 12$

17. Suppose a lumber mill can turn out up to 900 units of product each week. The mill must produce at least 100 units of lumber and 400 units of plywood. Write the constraints as a system of inequalities where x = the number of units of lumber and y = the number of units of plywood.

a) $x \leq 100$, $y \geq 400$, and $x + y \geq 900$ b) $x \geq 100$, $y \geq 400$, and $x + y \leq 900$
c) $x \geq 100$, $y \leq 400$, and $x + y \leq 900$ d) $x \geq 100$, $y \leq 400$, and $x + y \geq 900$

18. Find the maximum value of $f(x, y) = 2x + y - 4$ for the system of inequalities:
$y \leq -3x + 1$
$y \leq \frac{1}{2}x - 4$
$x \geq 0$
$y \geq 0$

a) alternate optimal solutions b) 2 c) infeasible d) unbounded

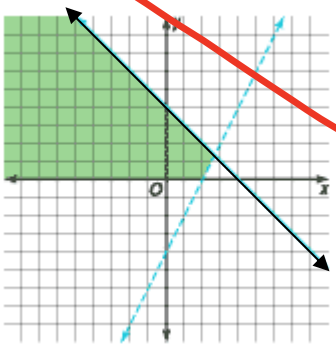
19. A feasible region has vertices at (4, 6), (-2, 3), (2, -2), and (3, 1). At which point is the maximum value of the function $f(x, y) = 2x + y$?
a) f(4,6) b) f(-2, 3) c) f(2, -2) d) f(3, 1)

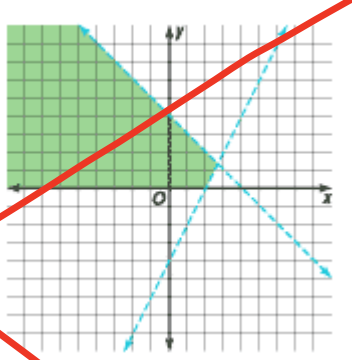
20. A small fish market sells only tuna and salmon. Tuna costs the fish market $0.75 per pound to buy and $2.53 per pound to clean and package. Salmon costs the fish market $3.00 per pound to buy and $2.75 per pound to clean and package. The fish market makes $2.50 per pound profit for each tuna it sells and $2.80 per pound profit for each salmon it sells. The fish market owner can spend only $159.00 per day to buy fish and $197.34 per day to clean and package the fish. What are the coordinates of the vertices of the feasible region, and what are the vales of t and s that maximize the objective function?

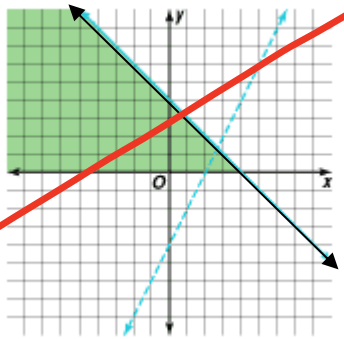
a) (0, 0), (0, 53), (78, 0), (46, 28); $t = 46$ and $s = 28$.
b) (0, 0), (53, 0), (0, 78), (28, 46); $t = 28$ and $s = 46$.
c) (0, 0), (0, 53), (78, 0), (28, 46); $t = 28$ and $s = 46$.
d) (0, 0), (0, 53), (78, 0), (46, 28); $t = 0$ and $s = 53$.

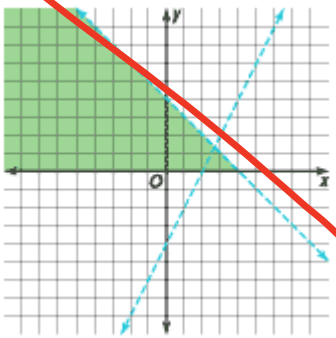
21. Solve the system of inequalities by graphing.

$x + y \leq 4$
$2x - y \leq 4$
$y \geq 0$

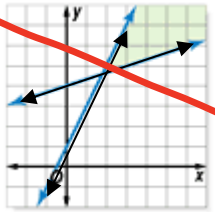
A. 

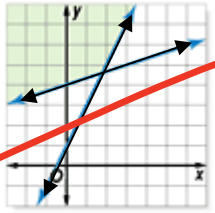
B. 

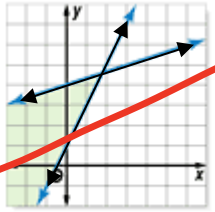
C. 

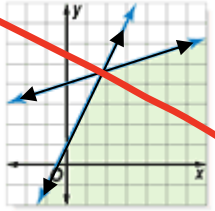
D. 

22. Which graph represents the following system: $y \geq 2x + 1$, and $y \leq \frac{1}{3}x + 4$?

A. 

B. 

C. 

D. 

23. Use the formula, $h = -16t^2 + v_0 t$, to answer the questions below if a bullet is shot straight upward with an initial speed of 800 ft/sec.

a) When does the bullet fall back to ground level? _____
b) When does it reach a height of 6400 feet? _____
c) How high is the highest point the bullet reaches? _____

a

24. Write an exponential function to model this situation: a population of 300 animals increases at an annual rate of 13%.

b $y = ab^x$

a) $f(x) = 300(0.113)^x$ b) $f(x) = 300(.87)^x$ c) $f(x) = 300(0.087)^x$ d) $f(x) = 300(1.13)^x$

25. In 1984, the average number of TV stations that were received in US households was 17 channels. In 1990, there were 27 channels.
a) Assuming the data is a linear model, find the line of best fit.
b) Explain the slope and y-intercept in practical terms.
c) Predict the average number of TV stations that a household will receive in 2011.

26. Among all rectangles that have a perimeter of 40 feet, find the dimensions of the one with the largest area.

27. Which type of function (linear, quadratic, cubic, quartic, or exponential) best represents the data in the table?

Wind speed (km/h)	0.5	2	4	6	8	11
Mosquito Bites	59.3	35.7	24.8	21.9	12.0	4.8

28. Find the domain of the function: $f(x) = \sqrt{x-1}$

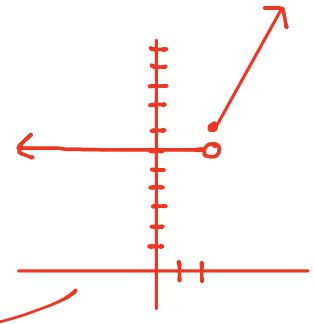
a) $(0,1) \cup (1,\infty]$ b) $(1,\infty)$ c) $[0,1) \cup (1,\infty)$ d) $[1,\infty)$

29. The graph $y = x^3 - 9x - 3$ is increasing between what interval/s?

a) $(-\infty, 7.39] \cup [-13.39, \infty)$ b) $(-\infty, -1.73] \cup [1.73, \infty)$ c) $[-1.73, 1.73]$ d) $[-13.39, 7.39]$

30. Evaluate the piecewise function at f(0), f(2), and f(3). $f(x) = \begin{cases} 6 \text{ if } x < 2 \\ 4x - 1 \text{ if } x \geq 2 \end{cases}$

a) f(0) = -1, f(2) = 6, f(3) = 11
b) f(0) = 6, f(2) = 7, f(3) = 11
c) f(0) = 0, f(2) = 6, f(3) = cannot determine
d) f(0) = 6, f(2) = 7, f(3) = 7



31. Graph the previous piecewise function and state the domain and range.

D: $(-\infty, \infty)$ Range: $[6] \cup [7, \infty)$

32. A silk-screen shop charges an initial fee of $10 to create the silk screen and $8.50 per shirt for the first 25 shirts. If you decide to purchase more than 25 shirts, the price goes down to $7.75 per shirt (after the first 25 shirts are purchased). Write a function that gives the cost, C, for an order of x shirts. How much does it cost to purchase 20 shirts? 40 shirts?

$180 $338.75

$f(x) = \begin{cases} 8.50x + 10 & , x \leq 25 \\ 222.5 + 7.75(x - 25) & , x > 25 \end{cases}$

33. Change from logarithmic form to exponential form: $\log_{27} 9 = \frac{2}{3}$

a) $9^{\frac{2}{3}} = 27$ b) $\left(\frac{2}{3}\right)^9 = 27$ c) $(9)^{\frac{3}{2}} = 27$ d) $27^{\frac{2}{3}} = 9$

34. Convert from exponential form to logarithmic form: $16^{1/2} = 4$

a) $\log_2 4 = 1/2$ b) $\log_{16} 1/2 = 4$ c) $\log_{16} 4 = 1/2$ d) $\log_{16} 1/2 = 4$

35. Solve $4^{6x} = 496$.

a) 0.6472 b) 0.7462 c) 3.6413 d) 4.477

36. Evaluate the following: (4 problems here!)

a) $\log_6 216 =$ 3 b) $\ln 1 =$ 0 c) $\log 10 =$ 1 d) $3^{\log_3 5} =$ 5

37. Solve the logarithmic equations, accurate to 4 decimal places. (3 problems here!)

a) $\log_x(-4) = 1/3$ b) $\log_4(3x-2) = 3$ c) $e^{4x-1} = 9$

$x = -64$ $x = 22$ $x \approx .7993$

38. The graph $y = 2\log_3(x-1)+2$ has an asymptote of _____.

a) y = 2 b) y = 1 c) x = 1 d) x = 2

39. Find the balance of a $500 investment after 18 years earning 7.9% interest compounded continuously.

a) $502.20 b) $541.10 c) $2146.32 d) $2072.70 $A = 500e^{(.079 \cdot 18)}$

40. What interest rate is required for an investment with continuously compounded interest to double in 5 years?

$2 = e^{5r}$

a) 3.47% b) 6.93% c) 13.86% d) 3.86

41. Determine the amount of money in a money market account providing an annual rate of 7% compounded daily if George invested $2500 and left it in the account for 10 years.

$A = 2500\left(1 + \frac{.07}{365}\right)^{365 \cdot 10}$

a) $4917.88 b) $4915.25 c) $4974.47 d) $5034.04

42. The half-life of radium-226 is 1590 years.

a) If a sample has a mass of 150 mg, find the mass that remains after 1000 years. $97g = 150(.5)^{\frac{1000}{1590}}$

b) After how many years will only 50 mg remain? $50 = 150(.5)^{\frac{t}{1590}}$

$t \approx 2520$ yrs.

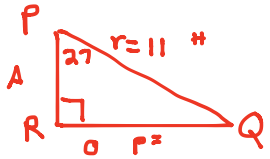
43. The number of bacteria in a culture is modeled by the function, $n(t) = 500e^{0.45t}$. How many bacteria are in the culture after 3 hours?

1929

44. If $\angle P = 27°$, $\angle R = 90°$, and $r = 11$, find p.

$\sin 27 = \frac{p}{11}$

a) 24.2 b) 5.6 c) 9.8 d) 5.0

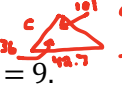


45. The angle of elevation of a ladder leaning against a wall is 55°. The ladder is 30 feet long. How high up the wall does it reach?

$\sin 55 = \frac{x}{30}$

a) About 52.30 ft b) about 17.21 ft c) about 24.57 ft d) about 42.8 ft

46. In ΔABC, find c if $\angle A = 36°$, $\angle B = 101°$, and $b = 42.7$.



$c = 43°$

$\frac{\sin 101}{42.7} = \frac{\sin 43}{c}$

a) about 40.2 b) about 29.7 c) about 25.3 d) about 31.8

47. Determine the number of possible solutions for ΔABC, given $\angle A = 40°$, $a = 7$, and $b = 9$.

a) two b) one c) three d) none

48. Determine the number of possible solutions for ΔABC, given $a = 7$, $b = 3$, and $\angle A = 115°$.

a) two b) one c) three d) none

49. In ΔABC, given $a = 22$, $b = 39$ and $c = 19$, find B.

a) about 144° b) about 126° c) about 36° d) about 54°

$39^2 = 22^2 + 19^2 - 2(22)(19)\cos B$

50. Two motorists start at the same point and travel in 2 straight courses. The courses diverge by 95°. If one is traveling at 50mph and the other is traveling at 60mph, how far apart will they be after 4 hours?

$x^2 = 200^2 + 240^2 - 2(200)(240)\cos 95$

$x \approx 326$ miles

51. A geologist measured a 43° angle of elevation to the top of a volcano crater. After moving 0.25 km farther away, the angle of elevation was 38°. Find the height of the volcano crater. $x \approx 1.2$ km

52. For a circle of radius 6 feet, find the arc length s cut off by a central angle of 18°. → $\frac{\pi}{10}$ $s = r\theta$ $s = 6\left(\frac{\pi}{10}\right)$

a) about 3.78 ft b) about 5.65 ft c) about 1.88 ft d) about 108 ft

53. Find the measure of the reference angle of -200°. $+360 = 160$ $180 - 160$ $20°$

a) 20° b) 140° c) 60° d) -200°

54. A sector has an area of 14.5 square meters. The radius of the circle is 4 meters. Find the radian measure of the central angle to the nearest tenth. $A = \frac{1}{2}\theta r^2$ $14.5 = \frac{1}{2}\theta(4)^2$

a) 7.3 radians b) 14.6 radians c) 1.8 radians d) 3.6 radians

55. Evaluate $\tan \frac{4\pi}{3}$. $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

a) $-\frac{\sqrt{3}}{3}$ b) $\frac{\sqrt{3}}{3}$ c) $-\sqrt{3}$ d) $\sqrt{3}$

56. Find an angle between 0 and 360° that is coterminal to -2100°. (Add 360 until you get a $0° < 360$)

a) 300° b) 30° c) 60° d) -300°

57. Find the terminal point of $t = \frac{-11\pi}{6}$.. Coterminal : $\frac{\pi}{6}$

a) $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ b) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ c) $\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$ d) $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

58. Given that $\sin t > 0$ ($+y$) and $\cos t < 0$ ($-x$), find the quadrant in which the terminal point determined by t lies.

a) I b) II c) III d) IV

59. Convert to radians: $-105°$

a) $\frac{7\pi}{12}$ b) $\frac{-7\pi}{12}$ c) $\frac{7\pi}{6}$ d) $\frac{-12}{7\pi}$

60. State the amplitude and period for the function $y = -3\sin 3\theta$.

a) -3; $\frac{3\pi}{2}$ b) -3, $\frac{2\pi}{3}$ c) 3, $\frac{3\pi}{2}$ d) 3, $\frac{2\pi}{3}$

61. What is the next term in the geometric sequence 16, -4, 1, $\frac{-1}{4}$, ...?

a) $\frac{-1}{8}$ b) 0 c) $\frac{1}{16}$ d) $\frac{1}{8}$

62. If the first term in an arithmetic series is 3, the last term is 136, and the sum is 1390, what are the first 3 terms? $1390 = \frac{n}{2}(3 + 136)$ $136 = 3 + (20-1)d$

a) 3, 10, 17 b) 3, 23, 43 c) 3, $36\frac{1}{3}$, 70 d) 3, 139, 1251

63. Find the 29th term in the arithmetic sequence -9, -4, 1, 6, … .
a) 136 b) 131 c) 126 d) 121

64. Evaluate the infinite geometric series 1.9 + 0.19 + 0.019 + ….
a) 19/10 b) 0.057 c) 2.109 d) 19/9

65. In a certain arithmetic sequence, $a_1 = -38$, $d = 7$, and $a_n = 74$. Find n.
a) 16 b) 17 c) 6 d) The sequence will never equal 74

66. Find the sum of the first 25 terms in the series -15 - 8 - 1 - ⋯ .
a) 1732 b) 1718 c) 1725 d) 1711

67. Find the fifth term of a geometric sequence whose first term is 6 and whose common ratio is $\frac{4}{3}$.
a) 512/27 b) 128/9 c) 2048/81 d) 32/3

68. Find the next three terms in the sequence 625, 250, 100, 40, ….
a) 25, 32.5, 51.25 b) 15, 5, 1 c) 10, –5, –20 d) 16, 6.4, 2.56

FORMULAS:

Law of Cosines: $a^2 = b^2 + c^2 - 2bc\cos A$

Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Arc Length (in radians): $s = r\theta$

Area of a sector (in radians): $A = \frac{1}{2}r^2\theta$

Compounded "n" times per year: $A = P(1 + \frac{r}{n})^{nt}$

Compounded continuously: $A = Pe^{rt}$

Exponential Growth: $n(t) = n_0 e^{rt}$

Half-Life: $m(t) = m_0 e^{-rt}$, $r = \frac{\ln 2}{\text{half - life}}$

Arithmetic Sequence and Series

$a_n = a_1 + (n-1)d$

$S_n = \frac{n}{2}(a_1 + a_n)$

Geometric Sequence and Series

$a_n = a_1 \cdot r^{(n-1)}$

$S_n = \frac{a_1(1 - r^n)}{1 - r}$, where $r \neq 1$

$S = \frac{a_1}{1 - r}$, where $|r| < 1$

**Will be given Sequences & Series Formulas and Law of Cosines/Law of Sines