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

$a_{18} = 9.9$

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

$= 1.4 + (n-1).5 = 1.4 + .5n - .5 = .5n + .9$

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

(1, 2) (5, 5) $d = \frac{5-2}{4} = \frac{3}{4}$

2, 2.75, 3.5, 4.25, 5

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

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

$= \frac{35}{2}(5 + 141)$

$= 2555$

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

$= 5 + (n-1)4$

$= 5 + 4n - 4$

$= 4n + 1$

$a_{35} = 4(35) + 1$

$a_{35} = 141$

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

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

$= \frac{34}{2}(5 + 71) = 17(76) = 1292$

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

Sum(seq(2x-7, x, 1, 4)) or $a_1 = 2(1) - 7 = -5$, $a_2 = 2(2) - 7 = -3$, $a_3 = 2(3) - 7 = -1$, $a_4 = 2(4) - 7 = 1$ add = -8

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

$a_6 = 1\left(\frac{3}{4}\right)^{6-1}$

$\left(\frac{3}{4}\right)^5 = \frac{243}{1024}$

write answer as a fraction

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

$a_6 = 48(-2)^{6-1} = 48(-2)^5 = 48(-32)$

$a_6 = -1536$

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

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

$a_8 = 9(-2)^7$

$a_8 = -1152$

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

9. Find the four geometric means between 128 and 4.

(1, 128) (6, 4) $\sqrt[5]{\frac{4}{128}} = \frac{1}{2}$

128, 64, 32, 16, 8, 4

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

$S_n = \frac{a_1(1-r^n)}{1-r} = \frac{1/3(1-6^5)}{1-6} = \frac{1/3(1-7776)}{5} = \frac{1555}{3}$ or $518.\overline{3}$

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

Bad question. Arith. series not geo.

2, 4, 6

$r = 2$ → Does not exist

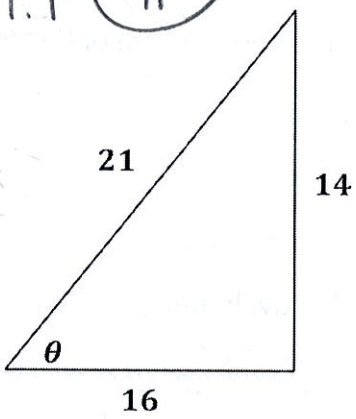
ck formula

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

$r = \frac{-2}{20} = \frac{-1}{10}$

$S_n = \frac{a_1}{1-r} = \frac{20}{1-(-1/10)} = \frac{20}{1.1} = \frac{200}{11}$

13. Find the six trigonometric functions for the given triangle:

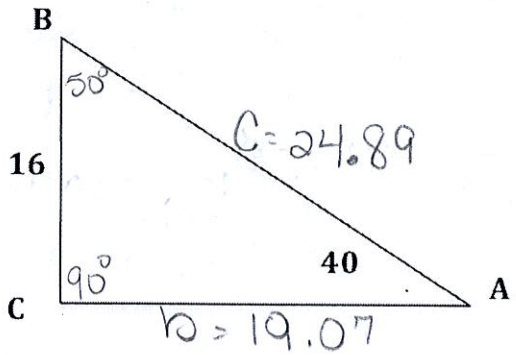


$\cos\theta = 16/21$ $\quad \sec\theta = 21/16$

$\sin\theta = 14/21 = \frac{2}{3}$ $\quad \csc\theta = 21/14 = 3/2$

$\tan\theta = \frac{14}{16} = \frac{7}{8}$ $\quad \cot\theta = \frac{8}{7}$

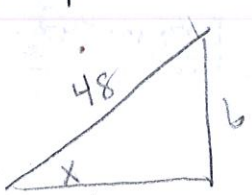
14. Find all the missing angle and side measures for the right triangle:



$\sin 40 = \frac{16}{c}$ $\quad \frac{16}{\sin 40} = c$ $\quad 24.89 = c$

$\tan 50 = \frac{b}{16}$ $\quad 19.07 = b$

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

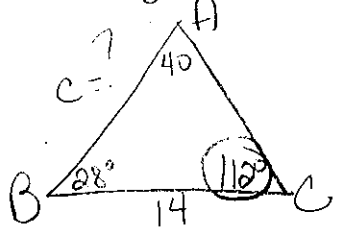


$\sin x = \frac{6}{48}$

$x = 7.18^\circ$

AFM Review for Final

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

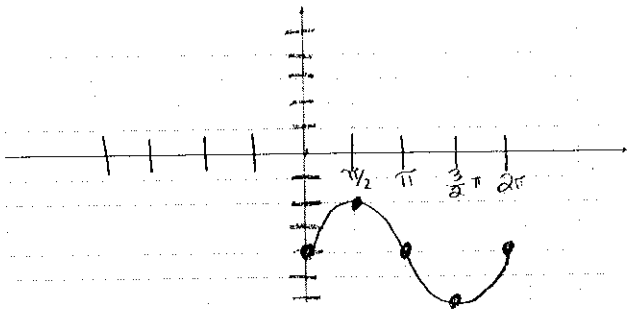


$\frac{\sin 40}{14} = \frac{\sin 112}{c}$

$c = 20.19$

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

A = 2
P = 2π
VS = $\downarrow 4$
PS = none



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

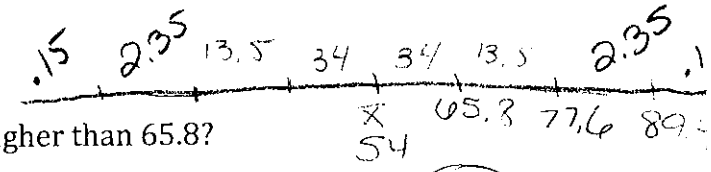
A = 6
P = $\frac{2\pi}{4} = \frac{\pi}{2}$
PS = none
VS = up 5

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

68%, 95%, 99.7%

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

95%



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

16% so .16(120) = 19.2 so approx 19 students scored higher than 65.8

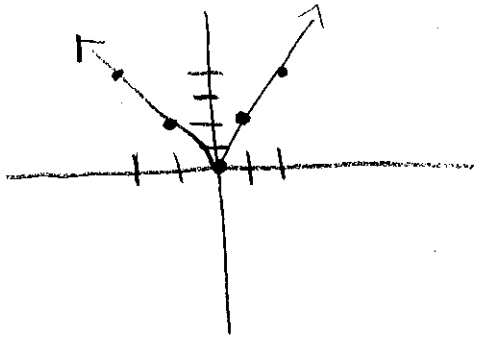
21. What percent scored lower than 54?

50%

22. Graph the piecewise function: $y = |2x|$

If writing as piecewise

$$f(x) = \begin{cases} -2x, & x < 0 \\ 2x, & x \geq 0 \end{cases}$$



23. 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?

$9 \cdot 8 \cdot 7 \cdot 6 = 3{,}024$ ways

OR $\quad {}_9P_4$

24. 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?

$2 \cdot 2 \cdot 2 =$ 8 possible

Ask

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

${}_8C_3 =$ 56 combinations

worked

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

$8! =$ 40,320

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

2 T's = 2! 2 O's = 2!
2 R's = 2!

$$\frac{12!}{(2!\,2!\,2!)} = 59{,}875{,}200 \text{ ways}$$

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

$12!$

OR ${}_{12}P_{12} = 479{,}001{,}600$ ways

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

${}_{25}C_5 =$ 53,130 groups

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

$({}_{12}C_5)({}_{13}C_7) =$ 1,359,072 ways

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

same as w/o replacement

$P(V) \cdot P(V) \cdot P(C) + P(C) \cdot P(V) \cdot P(V) + P(V) \cdot P(C) \cdot P(V)$

$\frac{2}{7} \cdot \frac{1}{6} \cdot \frac{5}{5} + \frac{5}{7} \cdot \frac{2}{6} \cdot \frac{1}{5} + \frac{2}{7} \cdot \frac{5}{6} \cdot \frac{1}{5}$

$\frac{10}{210} + \frac{10}{210} + \frac{10}{210} = 3\left(\frac{10}{210}\right) \approx .143$

AFM Review for Final

32. 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? $P(\text{not purple}) = \frac{8}{13} = .615$

✓ 33. 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?

$P(D)\cdot P(N) + P(N)\cdot P(D)$

$\frac{9}{22}\cdot\frac{8}{21} + \frac{8}{22}\cdot\frac{9}{21} = \frac{72}{462} + \frac{72}{462} = 2\left(\frac{72}{462}\right) = .312$

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

$\frac{5}{22}\cdot\frac{4}{21} = \frac{20}{462} = .043$

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

$P(4)\cdot P(6) = \frac{1}{6}\cdot\frac{1}{6} = \frac{1}{36} = .027$

For questions 36 – 38, 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:

36. You select Ace, Jack, King, King, without replacement. $P(A)\cdot P(J)\cdot P(K)\ P(K)$

$\frac{3}{12}\cdot\frac{3}{11}\cdot\frac{4}{10}\cdot\frac{3}{9} = .0091$

37. You select a Queen, King, Jack, Ace, with replacement. $P(Q)\cdot P(K)\ P(J)\ P(A)$

$\frac{2}{12}\cdot\frac{4}{12}\cdot\frac{3}{12}\cdot\frac{3}{12} = \frac{72}{20736} = .0035$

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

$P(Q)\ P(Q)\ P(A)\ P(\text{not Ace})$

$\frac{2}{12}\cdot\frac{1}{11}\cdot\frac{3}{10}\cdot\frac{7}{9} = \frac{42}{11{,}880} = .0035$

39. Find the value of ${}_6P_4$.

a) 15 b) 2 c) 24 d) 360

40. 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

S_x is for a sample = 2.55

σ_x is for an entire pop = 2.28

Describe the end behavior for both functions for 41.

41. $f(x) = 1 - 2x^2 - x^3$

a. As $x \to \infty, f(x) \to -\infty$.
As $x \to -\infty, f(x) \to \infty$.

b. As $x \to \infty, f(x) \to -\infty$.
As $x \to -\infty, f(x) \to -\infty$.

c. As $x \to \infty, f(x) \to \infty$.
As $x \to -\infty, f(x) \to -\infty$.

d. As $x \to \infty, f(x) \to \infty$.
As $x \to -\infty, f(x) \to \infty$.

$h(x) = -2x^4$

a. As $x \to \infty, h(x) \to -\infty$.
As $x \to -\infty, h(x) \to \infty$.

b. As $x \to \infty, h(x) \to \infty$.
As $x \to -\infty, h(x) \to \infty$.

c. As $x \to \infty, h(x) \to -\infty$.
As $x \to -\infty, h(x) \to -\infty$.

d. As $x \to \infty, h(x) \to \infty$.
As $x \to -\infty, h(x) \to -\infty$.

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

$(x+9)(x-6) = (x+8)(x-7)$
$x^2 + 3x - 54 = x^2 + x - 56$
$2x = -2$
$x = -1$

a) x = -1 b) x = 0 c) x = 2 d) x = -3

43. Evaluate: $log_9 729$

a) 3 b) 5 c) 4 d) 2

44. Evaluate: log 94

a) 9.4 b) 1.97 c) .51 d) 3.95

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

a) -0.4030 b) +0.4351 +.435 c) 0.7559 d) -0.7559

46. $log_9(x^2 + 7) = log_9(43)$ $x^2 + 7 = 43$ $x^2 = 36$ $x = \pm 6$

a) ± 36 b) ±6 c) ±6.56 d) ±5

47. $\ln(-2y + 5) - \ln(y + 4) = \ln(-11y - 2)$ find zeros in calc.

a) (-3.68, - .32) b) infinite solutions c) (3.68, .32) d) no solution

$\ln \frac{-2y+5}{y+4} = \ln(-11y-2)$

$-2y + 5 = (-11y - 2)(y + 4)$
$-2y + 5 = -11y^2 - 46y - 8$

48. Radioactive Iodine-129 decays over time into stable Xenon-129. The percent of I-129 remaining in several mineral samples can be used to calculate the radioactive half-life of I-129, based on the ages of the mineral samples determined by other "dating" techniques. The following table shows data on the percent of I-129 remaining in minerals of different ages.

Age (billions of years)	2.0	3.5	4.2	4.3
Percent of original I-129	74	59	53	52

a. Find the regression equation for the percent of I-129 remaining as a function of time x.
b. Write the regression equation in terms of base e.
c. Use the equation from part b to estimate the half-life of Iodine-129.

a. a. $y = 100 \times (0.854)^x$
b. $y = 100e^{-0.158x}$
c. $x = 3.2$ billion years

b. a. $y = 100 \times (0.858)^x$
b. $y = 100e^{-0.153x}$
c. $x = 3.3$ billion years

$.5 = e^{-.153x}$
$\ln .5 = -.153x$

c. a. $y = 100 \times (0.854)^x$
b. $y = 100e^{-0.158x}$
c. $x = 4.4$ billion years

(d.) a. $y = 100 \times (0.858)^x$
b. $y = 100e^{-0.153x}$
c. $x = 4.5$ billion years

$50 = 100e^{-.153x}$
$\frac{\ln .5}{-.153} = x \quad x = 4.53$

$e^x = .858$
$x = \ln .858$
$x = -.153$

49. Find an exponential function to model the data.

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

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) $f(x) = -42.8 + 116.4 \ln x$

50. 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) $49.79x^{1.50}$ $r = .99997$
b) $5.48x^{.32}$
c) $156.13x - 175.71$
d) $1.5x + 3.91$

51. As automobiles age, the average miles traveled per gallon decreases. Determine the regression equation that best models the data.

Age (years)	MPG
1	35
3	34
5	33
7	31
9	28
11	26
13	23
15	18

a) Power $r = -.797$
b) Logarithmic
c) Quadratic $.995$
d) Exponential $-.949$

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

$a_2 = 3$ $a_3 = 7$

$a_2 = a_{2-1} + 2(2-1)$
$= 1 + 2(1) = 3$

$a_3 = a_{3-1} + 2(3-1)$
$= a_2 + 2(2)$
$= 3 + 4 = 7$

$a_4 = a_{4-1} + 2(4-1)$
$= a_3 + 2(3)$
$= 7 + 6 = 13$
$a_4 = 13$

X $a_n = 2n - 1$
B $a_n = n^2 - n + 1$
X $a_n = n^2 - 2n + 2$
D $a_n = 2n^2 - 2n - 1$

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

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

A $y = 6\sin\left(\frac{x}{12} - 3\right) + 1$
X $y = \frac{3}{2}\cos\left(\frac{3x}{4} - 1\right) - 3$
C $y = 6\cos\left(\frac{3x}{4} - 1\right) - 3$
X $y = \frac{3}{2}\sin\left(\frac{x}{12} - 3\right) - 1$

$\frac{2\pi}{1/12} = 24\pi$