Name Key

ALGEBRA 2 W/ TRIGONOMETRY – FINAL EXAM
Textbook Chapters 4, 5, 6, 9, 10

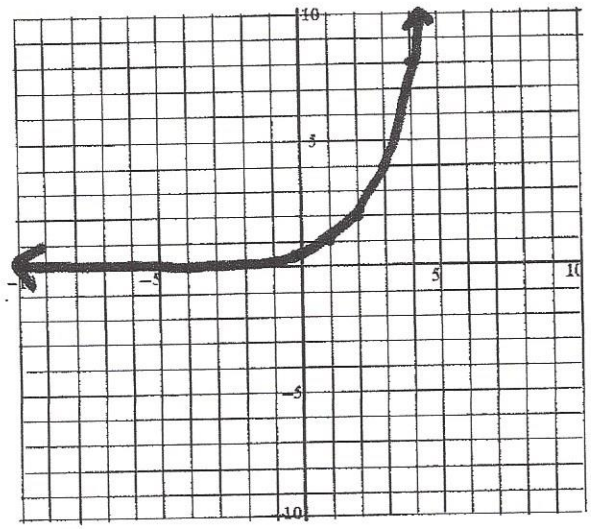
Chapter 4 • Graph Exponential Growth Functions (4.1) • Graph Exponential Decay Functions (4.2) • Use Functions Involving e (4.3) • Evaluate Logarithms and Graph Logarithmic Functions (4.4) • Apply Properties of Logarithms (4.5) • Solve Exponential and Logarithmic Equations (4.6)	**Chapter 5** • Graph Simple Rational Functions (5.2) • Graph General Rational Functions (5.3) • Multiply and Divide Rational Expressions (5.4) • Add and Subtract Rational Expressions (5.5) • Solve Rational Equations (5.6)
Chapter 6 • Use Combinations and the Binomial Theorem (6.1) • Mean, Median, Mode, and Range (SR31) • Use Normal Distribution (6.3) • Select and Draw Conclusions from Samples (6.4)	**Chapter 9** • Use Trigonometry with Right Triangles (9.1) • Define General Angles and Use Radian Measure (9.2) • Evaluate Trigonometric Functions of Any Angle (9.3) • Evaluate Inverse Trigonometric Functions (9.4)
Chapter 10 • Graph Sine, Cosine, and Tangent Functions (10.1) • Translate and Reflect Trigonometric Graphs (10.2) • Verify Trigonometric Identities (10.3)	

A 1-page handwritten reference sheet is allowed on the final exam.

ALGEBRA 2 W/ TRIGONOMETRY – FINAL EXAM REVIEW
Chapter 4 Review

Graph. State the horizontal asymptote, domain and range.

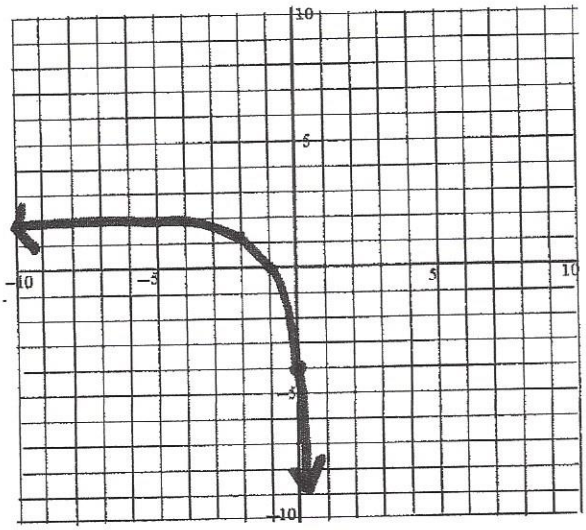
1. $f(x)=\frac{1}{2}\bullet 2^{x}$



Horizontal Asymptote: $y=0$

Domain: $\mathbb{R}$ Range: $y>0$

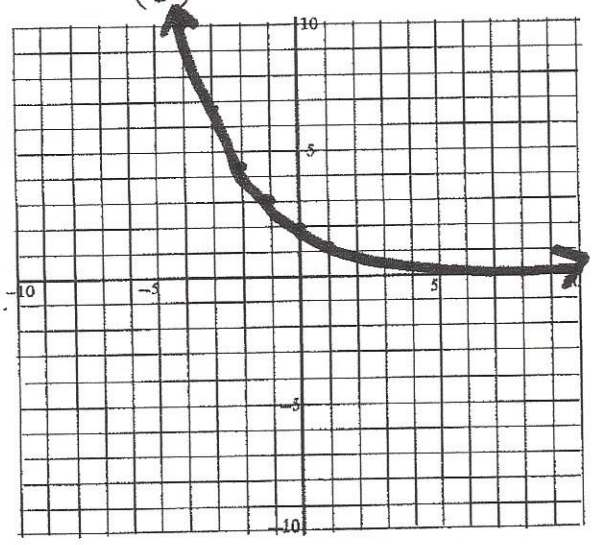
2. $f(x)=-2\bullet 3^{x+1}+2$



Horizontal Asymptote: $y=2$

Domain: $\mathbb{R}$ Range: $y<2$

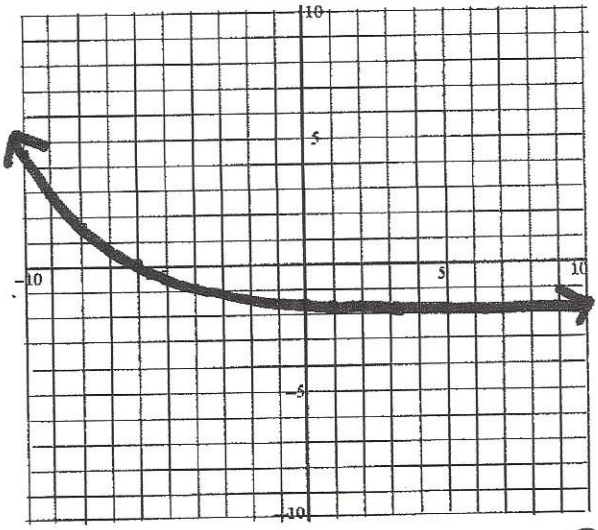
3. $f(x)=2\left(\frac{2}{3}\right)^{x}$



Horizontal Asymptote: $y=0$

Domain: $\mathbb{R}$ Range: $y>0$

4. $f(x)=\frac{1}{2}\left(\frac{3}{4}\right)^{x+1}-2$



Horizontal Asymptote: $y=-2$

Domain: $\mathbb{R}$ Range: $y>-2$

5. On your birthday, you receive a cell phone for $300. The value of the cell phone decreases by 20% each year. What will the value be 4 years from now?

$Y = 300(1 - .2)^4$

$= 300(.8)^4$

$= \$122.88$

6. A new motorboat costs $6000. The value of the boat decreases by 15% each year. What is the value of the boat after 3 years?

$Y = 6000(1 - .15)^3$

$= 6000(.85)^3$

$= \$3,684.75$

7. You deposit $1650 in an account that pays 4.275% annual interest. What is the balance after 5 years if compounded:

(a) monthly

$A = 1650\left(1 + \frac{.04275}{12}\right)^{12 \cdot 5}$

$\$2042.44$

(b) daily

$A = 1650\left(1 + \frac{.04275}{365}\right)^{365 \cdot 5}$

$\$2043.19$

(c) continuously

$A = 1650e^{.04275 \cdot 5}$

$\$2043.22$

8. In 2 years, you want to have $5000 in your savings account. Find the amount that you should deposit if the account pays 3% annual interest, compounded monthly.

$5000 = x\left(1 + \frac{.03}{12}\right)^{12 \cdot 2}$

$\frac{5000}{1.06176} = \frac{x(1.06176)}{1.06176}$

$\$4709.18$

9. You deposit $300 into a savings account that pays 5% annual interest. If the account compounds daily, how long will it take for the account to reach $600, to the nearest year?

$A = 300\left(1 + \frac{.05}{365}\right)^{365 x}$

[illegible]

* look @ table of values

14 years

Simplify the expression.

10. $\log_5 625^x$

$\log_5 5^{4x} = 4x$

11. $\log_2 \left(\frac{1}{4}\right)^x$

$\log_2 2^{-2x} = -2x$

12. $\log_4 256^{2x}$

$\log_4 4^{4\cdot 2x} = 8x$

13. $\log 100^{4x}$

$\log_{10} 10^{2\cdot 4x} = 8x$

÷ x ^

Expand the expression.

14. $\ln\left(4y^2\right)$

$\ln 4 + \ln y^2$

$\ln 4 + 2\ln y$

15. $\log_4\left(16x^8y^6\right)$

$\log_4 16 + \log_4 x^8 + \log_4 y^6$

$2 + 8\log_4 x + 6\log_4 y$

16. $\log_{\frac{1}{2}} \sqrt{xy} = \log_{\frac{1}{2}} (xy)^{\frac{1}{2}} = \log_{\frac{1}{2}} x^{\frac{1}{2}} y^{\frac{1}{2}}$

$\log_{\frac{1}{2}} x^{\frac{1}{2}} + \log_{\frac{1}{2}} y^{\frac{1}{2}}$

$\frac{1}{2}\log_{\frac{1}{2}} x + \frac{1}{2}\log_{\frac{1}{2}} y$

17. $\ln xy$

$\ln x + \ln y$

18. $\log_3 \frac{6y^4}{x^8}$

$\log_3 6y^4 - \log_3 x^8$

$\log_3 6 + \log_3 y^4 - \log_3 x^8$

$\log_3 6 + 4\log_3 y - 8\log_3 x$

19. $\ln \frac{\sqrt[3]{x}}{y^2} = \ln \frac{x^{\frac{1}{3}}}{y^2}$

$\ln x^{\frac{1}{3}} - \ln y^2$

$\frac{1}{3}\ln x - 2\ln y$

Condense the expression. ^ ÷ x L to R

20. $\log_6 5 + 3\log_6 2$

$\log_6 5 + \log_6 2^3$

$\log_6 5 + \log_6 8$

$\log_6 40$

21. $\ln 4xy^2 - 2\ln x^2 y$

$\ln 4xy^2 - \ln (x^2 y)^2$

$\ln \frac{4xy^2}{(x^2y)^2} = \ln \frac{4xy^2}{x^4y^2} = \ln \frac{4}{x^3}$

22. $\log_6 2 + \log_6 18$

$\log_6 36 = 2$

23. $\ln xy + \ln xy^2 - \ln x^2 y$

$\ln ((xy \cdot xy^2) \div (x^2 y))$

$\ln \frac{x^2y^3}{x^2y}$

$\ln y^2$

Solve the equation.

24. $4^{2x+4} = 16^{3x-6}$

$4^{1(2x+4)} = 4^{2(3x-6)}$

$2x+4 = 6x-12$

$-2x+12 \quad -2x+12$

$\frac{16}{4} = \frac{4x}{4}$

$x = 4$

25. $\left(\frac{1}{4}\right)^{x+8} = \left(\frac{1}{2}\right)^{x^2+1}$

$2^{-2(x+8)} = 2^{-1(x^2+1)}$

$-2x-16 = -x^2-1$

$+x^2+1 \quad +x^2+1$

$x^2-2x-15=0$

$(x-5)(x+3)=0$

$x=5 \quad x=-3$

26. $27^x = 9^{x+5}$

$3^{3(x)} = 3^{2(x+5)}$

$3x = 2x+10$

$-2x \quad -2x$

$x = 10$

27. $36^{5x+2} = \left(\frac{1}{6}\right)^{11-x}$

$6^{2(5x+2)} = 6^{-1(11-x)}$

$10x+4 = -11+x$

$-x \quad -4 \quad -4 \quad -x$

$\frac{9x}{9} = \frac{-15}{9}$

$x = \frac{-5}{3}$

28. $18^x = 10$

$\log_{18} 18^x = \log_{18} 10$

$x = \log_{18} 10$

$x = \frac{\log 10}{\log 18} \approx .80$

29. $7^{2x} = 30$

$\log_7 7^{2x} = \log_7 30$

$\frac{2x}{2} = \frac{\log_7 30}{2}$

$x \approx .87$

30. $\log_3 x + \log_3 (x-6) = 3$

$\log_3 (x^2 - 6x) = 3$

$3^{\quad} \quad 3$

$x^2 - 6x = 27$

$-27 \quad -27$

$x^2 - 6x - 27 = 0$

$(x-9)(x+3) = 0$

$x = 9$ ~~$x = -3$~~

31. $\log_2 (x^2 + 2x) = 3$

$2^{\quad} \quad 2$

$x^2 + 2x = 8$

$-8 \quad -8$

$x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x = -4$ $x = 2$

32. $\log_4 (2x) + \log_4 (x+7) = 2$

$4^{\log_4 (2x^2+14x)} = 4^2$

$2x^2 + 14x = 16$

$-16 \quad -16$

$\frac{2x^2 + 14x - 16}{2} = \frac{0}{2}$

$x^2 + 7x - 8 = 0$

$(x+8)(x-1) = 0$

~~$x = -8$~~ $x = 1$

33. $\log_8 (x) + \log_8 (x+12) = 2$

$8^{\log_8 (x^2+12x)} = 8^2$

$x^2 + 12x = 64$

$-64 \quad -64$

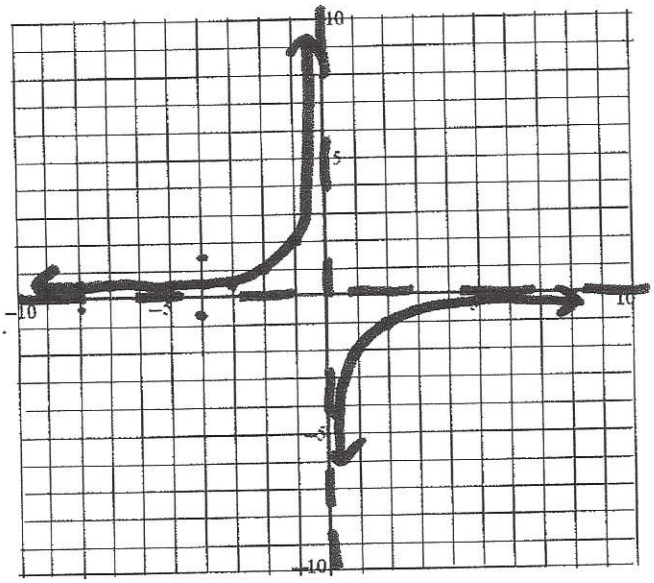
$x^2 + 12x - 64 = 0$

$(x+16)(x-4) = 0$

~~$x = -16$~~ $x = 4$

Graph.

34. $y = \dfrac{-2}{x}$



Domain: $x \neq 0$

Range: $y \neq 0$

Equations of vertical asymptote(s): $x = 0$

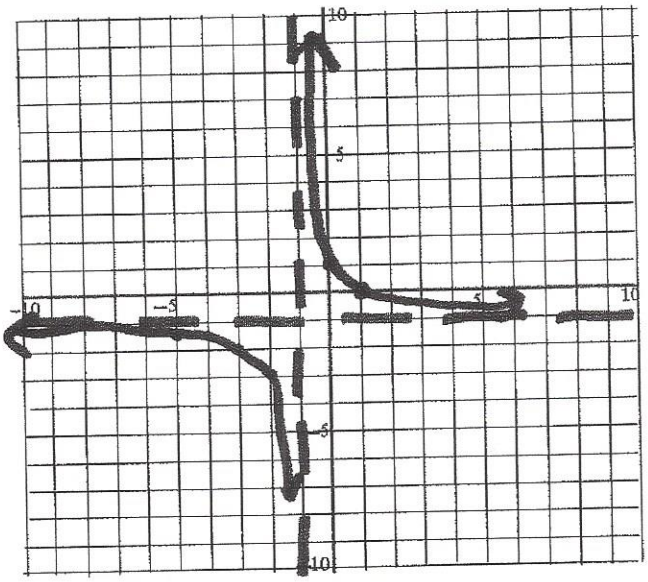
Coordinates of any hole(s): none

Equation of horizontal asymptote(s): $y = 0$

Coordinates of the x-intercept(s): none

Coordinates of the y-intercept: none

35. $f(x) = \dfrac{2}{x+1} - 1$



Domain: $x \neq -1$

Range: $y \neq -1$

Equations of vertical asymptote(s): $x = -1$

Coordinates of any hole(s): none

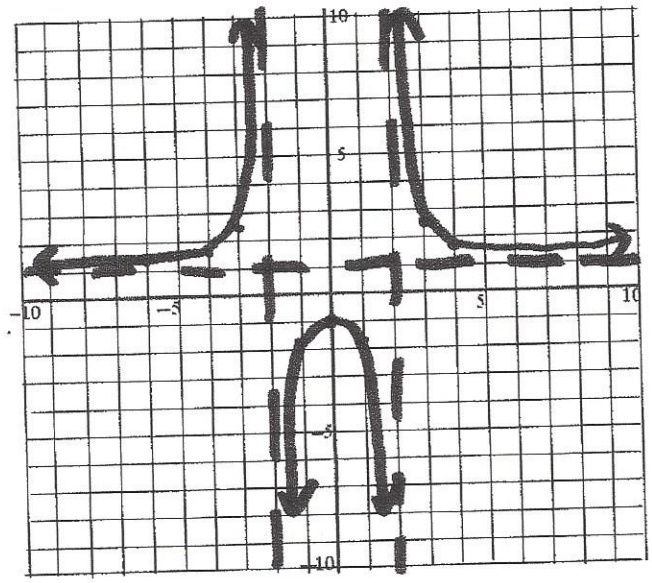
Equation of horizontal asymptote(s): $y = -1$

Coordinates of the x-intercept(s): $(1, 0)$

Coordinates of the y-intercept: $(0, 1)$

Graph.

36. $y = \dfrac{(x^2+4)}{(x^2-4)}$



Domain: $x \neq -2, 2$

Range: $y \leq -1 \quad y > 1$

Equations of vertical asymptote(s): $x = \pm 2$

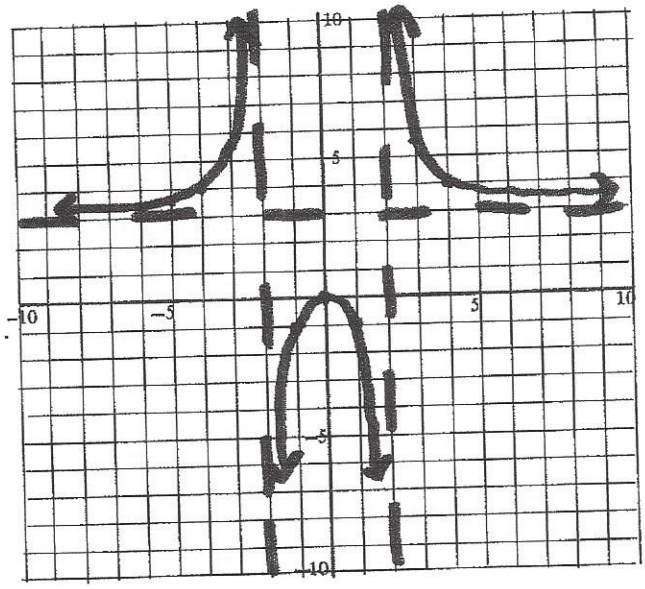
Coordinates of any hole(s): none

Equation of horizontal asymptote(s): $y = 1$

Coordinates of the x-intercept(s): none

Coordinates of the y-intercept: $(0, -1)$

37. $f(x) = \dfrac{3x^2}{x^2-4}$



Domain: $x \neq \pm 2$

Range: $y \leq 0 \quad y > 3$

Equations of vertical asymptote(s): $x = \pm 2$

Coordinates of any hole(s): none

Equation of horizontal asymptote(s): $y = 3$

Coordinates of the x-intercept(s): $(0,0)$

Coordinates of the y-intercept: $(0,0)$

Simplify the rational expression, if possible.

38. $\frac{x^2+7x+12}{x^2-7x+12} = \frac{(x+4)(x+3)}{(x-4)(x-3)}$

not possible

39. $\frac{x^2+5x}{x^2+6x+5} = \frac{x(x+5)}{(x+1)(x+5)}$

$\frac{x}{x+1}$

40. $\frac{x^2-11x+24}{x^2-3x-40} = \frac{(x-8)(x-3)}{(x-8)(x+5)}$

$\frac{x-3}{x+5}$

41. $\frac{8x^2+10x-3}{6x^2+13x+6} = \frac{(4x-1)(2x+3)}{(2x+3)(3x+2)}$

4·2, 1·8 ; 3·1 ; 1·6, 2·3 ; 1·6, 2·3

$\frac{4x-1}{3x+2}$

42. $\frac{x^2-4}{2x^2+7x+6} = \frac{(x+2)(x-2)}{(2x+3)(x+2)}$

$\frac{x-2}{2x+3}$

43. $\frac{2x^2+7x+5}{2x^2+1x-15} = \frac{(2x+5)(x+1)}{(2x+5)(x-3)}$ *

$\frac{x+1}{x-3}$

Perform the indicated operation and simplify.

44. $\frac{1}{8}\frac{x^2y}{4y^3} \cdot \frac{12x^2y^2}{20x^3} = \frac{x^4y^3}{2x^3y^3}$

$= \frac{x}{2}$

45. $\frac{2x^3}{7xy^2} \div \frac{6xy^2}{14y^3} = \frac{2x^3}{7xy^2} \cdot \frac{14y^3}{6xy^2}$

$\frac{2x^3y^3}{3x^2y^4} = \frac{2x}{3y}$

Perform the indicated operation and simplify.

46. $\frac{3 \cdot 7}{3 \cdot 5x} - \frac{4 \cdot 5}{3x \cdot 5}$

$\frac{21}{15x} - \frac{20}{15x} = \boxed{\frac{1}{15x}}$

47. $\frac{2x}{x^2-1} + \frac{2x-3}{x^2+5x+4}$

$(x+1)(x-1)(x+4)$

$\frac{(2x^2+8x)+(2x^2-5x+3)}{(x+1)(x-1)(x+4)} = \boxed{\frac{4x^2+3x+3}{(x+1)(x-1)(x+4)}}$

48. $\frac{4x^2y}{3y^2} \div \frac{16x^4}{9x^3y^2}$

$\frac{4x^2y}{3y^2} \cdot \frac{9x^3y^2}{16x^4} = \frac{3x^5y^3}{4x^4y^2}$

$= \boxed{\frac{3xy}{4}}$

49. $\frac{x^2-2x-3}{2x-4} \cdot \frac{x^2+3x-10}{x^2+6x+5}$

$\frac{(x-3)(x+1)(x+5)(x-2)}{2(x-2)(x+5)(x+1)}$

$\boxed{\frac{x-3}{2}}$

50. $\frac{4}{3x} - \frac{1}{2x^2}$ $(6x^2)$

$\frac{8x}{6x^2} - \frac{3}{6x^2} = \boxed{\frac{8x-3}{6x^2}}$

51. $\frac{4x}{x^2-9} + \frac{(3x-1)(x-3)}{x^2+5x+6}$

$(x+3)(x-3)(x+2)$

$\frac{4x^2+8x+3x^2-10x+3}{(x+3)(x+2)(x-3)}$

$\boxed{\frac{7x^2-2x+3}{(x+3)(x+2)(x-3)}}$

Solve the equation.

52. $\frac{x+4}{3x+5} = \frac{2x-1}{3x+1}$

$(x+4)(3x+1) = (2x-1)(3x+5)$

$3x^2+13x+4 = 6x^2+7x-5$

$-3x^2-13x-4 \quad -3x^2-13x-4$

$\frac{0}{3} = \frac{3x^2-6x-9}{3}$

$0 = x^2-2x-3$

$0 = (x-3)(x+1)$

$\boxed{x=3}$ $\boxed{x=-1}$

53. $\frac{x^2+1}{3-3x} = \frac{x+2}{3}$

$3(x^2+1) = (3-3x)(x+2)$

$3x^2+3 = 3x+6-3x^2-6x$

$3x^2+3 = -3x^2-3x+6$

$+3x^2 \quad +3x \quad -6 \quad +3x^2 \quad +3x$

$6x^2+3x-3 = 0$

$2x^2+x-1 = 0$

$(2x-1)(x+1) = 0$

$\boxed{1/2}$ $\boxed{-1}$

Solve the equation.

54. $\frac{4}{3x-1}=\frac{5}{2x+4}$

$4(2x+4)=5(3x-1)$

$8x+16=15x-5$

$-8x+5 \quad -8x+5$

$\frac{21}{7}=\frac{7x}{7}$ $x=3$

55. $\frac{x+3}{x^2-5}=\frac{4}{x-2}$

$(x+3)(x-2)=4(x^2-5)$

$x^2+x-6=4x^2-20$

$-x^2-x+6 \quad -x^2-x+6$

$0=3x^2-x+14$

$0=(3x-7)(x+2)$

$7/3$ -2

56. $\frac{x+5}{2x+3}+\frac{x+1}{-2x}=-1$ $(2x+3)(-2x)$

$(-2x)(x+5)+(x+1)(2x+3)=(2x)(2x+3)$

$-2x^2-10x+2x^2+5x+3=4x^2+6x$

$-5x+3=4x^2+6x$

$+5x-3 \quad +5x-3$

$0=4x^2+11x-3$

$0=(4x-1)(x+3)$

$1/4$ -3

57. $\frac{3+x}{2}+2x=\frac{6x+1}{4-x}$ $2(4-x)$

$(3+x)(4-x)+4x(4-x)=2(6x+1)$

$12-3x+4x-x^2+16x-4x^2=12x+2$

$-5x^2+17x+12=12x+2$

$-12x \quad -2 \quad -12x-2$

$\frac{-5x^2+5x+10}{-5}=\frac{0}{-5}$

$x^2-x-2=0$

$(x-2)(x+1)=0$

$x=2$

$x=-1$

58. $\frac{3x}{x+1}+\frac{6}{2x}=\frac{7}{x}$ $(x+1)(2x)$

$(3x)(2x)+6(x+1)=14(x+1)$

$6x^2+6x+6=14x+14$

$-14x-14 \quad -14x-14$

$\frac{6x^2-8x-8}{2}=\frac{0}{2}$

$3x^2-4x-4=0$

$(3x+2)(x-2)=0$

$-2/3$

2

59. $\frac{2x+14}{x+4}-2=\frac{2x+20}{2x+8}$ $2(x+4)$

$2(2x+14)-4(x+4)=2x+20$

$4x+28-4x-16=2x+20$

$-12=2x+20$

$-20 \quad -20$

$\frac{-32}{2}=\frac{2x}{2}$

$x=-16$

Find the number of combinations.

60. ${}_8C_3 = 56$	61. ${}_7C_4 = 35$
62. ${}_6C_4 = 15$	63. ${}_9C_5 = 126$

The Student Senate consists of 6 seniors, 5 juniors, 4 sophomores, and 3 freshmen.

64. How many different committees of exactly 2 seniors and 2 juniors can be chosen?

${}_6C_2 \times {}_5C_2$

$15 \times 10 = 150$

65. How many different committees of at most 4 students can be chosen?

${}_{18}C_4 + {}_{18}C_3 + {}_{18}C_2$

$3060 + 816 + 153$

$+ {}_{18}C_1 + {}_{18}C_0 = 4048$

$+ 18 + 1$

66. Use the binomial theorem to write the binomial expansion of $(2x-4)^7$.

$1\ (2x)^7\ (-4)^0 \rightarrow 128x^7$

$7\ (2x)^6\ (-4)^1 \rightarrow -1792x^6$

$21\ (2x)^5\ (-4)^2 \rightarrow +10752x^5$

$35\ (2x)^4\ (-4)^3 \rightarrow -35840x^4$

$35\ (2x)^3\ (-4)^4 \rightarrow +71680x^3$

$21\ (2x)^2\ (-4)^5 \rightarrow -86016x^2$

$7\ (2x)^1\ (-4)^6 \rightarrow +57344x$

$1\ (2x)^0\ (-4)^7 \rightarrow -16384$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
* 1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1

$128x^7 - 1792x^6 + 10752x^5 - 35840x^4 + 71680x^3 - 86016x^2 + 57344x - 16384$

67. Find the coefficient of the x^4 term in the expansion of $(x+3)^8$.

$1\ (x)^8\ (3)^0$
$8\ (x)^7\ (3)^1$
$28\ (x)^6\ (3)^2$
$56\ (x)^5\ (3)^3$
$70\ (x)^4\ (3)^4$ → $5670\,x^4$
$56\ (x)^3\ (3)^5$
$28\ (x)^2\ (3)^6$
$8\ (x)^1\ (3)^7$
$1\ (x)^0\ (3)^8$

68. Find the coefficient of the x^3 term in the expansion of $(x-2)^7$.

$1\ (x)^7\ (-2)^0$
$7\ (x)^6\ (-2)^1$
$21\ (x)^5\ (-2)^2$
$35\ (x)^4\ (-2)^3$
$35\ (x)^3\ (-2)^4$ → $560\,x^3$
$21\ (x)^2\ (-2)^5$
$7\ (x)^1\ (-2)^6$
$1\ (x)^0\ (-2)^7$

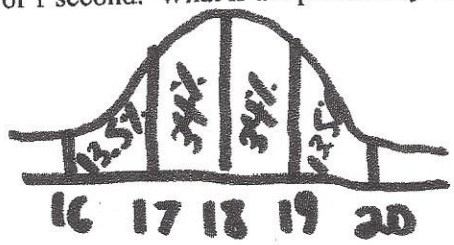
69. You are visiting a zoo, and have 7 exhibits left to see. You have time to see 3 more. How many different combinations of exhibits can you see?

$_7C_3 = 35$

70. You are renting movies at a video store, and there are 8 movies that you would like to rent. You have enough money to rent 4 of them. How many different combinations of movies can you rent?

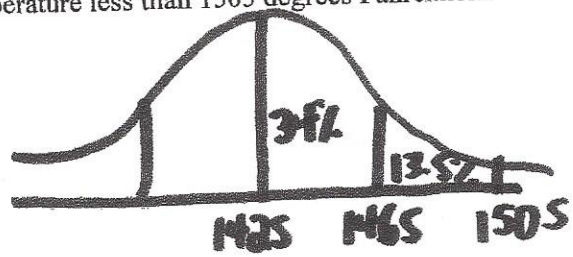
$_8C_4 = 70$

71. After sending, the email of a certain system has normally distributed arrival times with mean of 18 seconds and standard deviation of 1 second. What is the probability that a randomly selected email will take longer than 16 seconds to arrive?



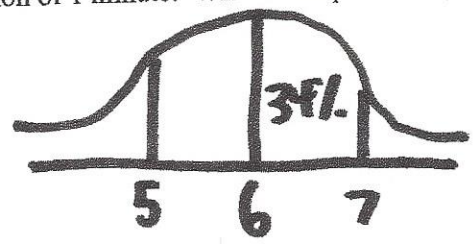
97.5%

72. A student found that the temperature of a ceramic furnace is normally distributed with mean temperature of 1425 degrees Fahrenheit and standard deviation of 40 degrees. What is the probability that a randomly selected furnace will have a temperature less than 1505 degrees Fahrenheit?



97.5%

73. The time a medical team takes to arrive at the scene of an accident is normally distributed with a mean of 6 minutes and a standard deviation of 1 minute. What is the probability that the medical team takes at most 7 minutes to arrive at the scene of an accident?



84%

Find the margin of error for a survey with the given sample size. Round your answer to the nearest tenth of a percent.

74. 2400 $\pm \frac{1}{\sqrt{2400}}$ ±2.0%

75. 180 $\pm \frac{1}{\sqrt{180}}$ ±7.5%

76. 324 $\pm \frac{1}{\sqrt{324}}$ ±5.6%

77. 288 $\pm \frac{1}{\sqrt{288}}$ ±5.9%

Find the sample size required to achieve the given margin of error. Round your answer to the nearest whole number.

78. 10% $\frac{1}{\sqrt{x}} = .1$ $\frac{1}{1} = \frac{\sqrt{x}}{.1}$ $\left(\frac{1}{.1}\right)^2 = (\sqrt{x})^2$ $x = 100$

79. 1% $\frac{1}{\sqrt{x}} = .01$ $(\sqrt{x})^2 = \left(\frac{1}{.01}\right)^2$ 10,000

80. 2% $\frac{1}{\sqrt{x}} = .02$ $(\sqrt{x})^2 = \left(\frac{1}{.02}\right)^2$ 2500

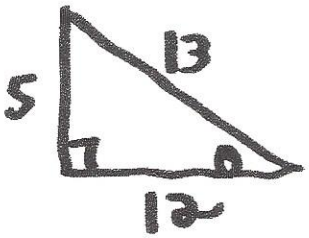
81. 4.5% $\frac{1}{\sqrt{x}} = .045$ $(\sqrt{x})^2 = \left(\frac{1}{.045}\right)^2$ 494

ALGEBRA 2 W/ TRIGONOMETRY – FINAL EXAM REVIEW
Chapter 9 Review

Let θ be an acute angle of a right triangle. Find the value of the other five trigonometric functions of θ.

82. $\sin\theta = \frac{5}{13}$

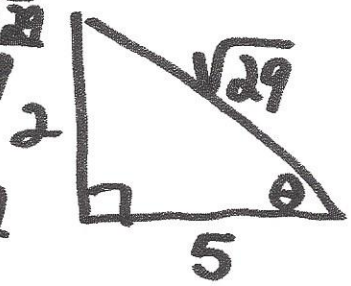
$\cos\theta = \frac{12}{13}$ $\tan\theta = \frac{5}{12}$ $\csc\theta = \frac{13}{5}$ $\sec\theta = \frac{13}{12}$ $\cot\theta = \frac{12}{5}$



$a^2+5^2=c^2$

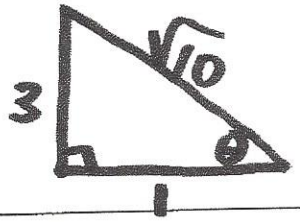
83. $\tan\theta = \frac{2}{5}$

$\sin\theta = \frac{2}{\sqrt{29}} = \frac{2\sqrt{29}}{29}$ $\cos\theta = \frac{5\sqrt{29}}{29}$ $\cot\theta = \frac{5}{2}$ $\csc\theta = \frac{\sqrt{29}}{2}$ $\sec\theta = \frac{\sqrt{29}}{5}$



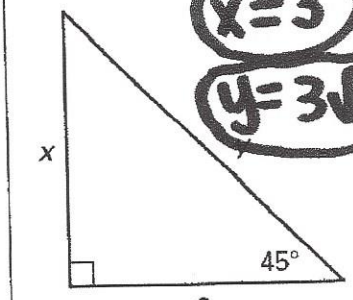
84. $\tan\theta = \frac{3}{1}$

$\sin\theta = \frac{3\sqrt{10}}{10}$ $\cos\theta = \frac{\sqrt{10}}{10}$ $\cot\theta = \frac{1}{3}$ $\csc\theta = \frac{\sqrt{10}}{3}$ $\sec\theta = \sqrt{10}$



Find the exact values of x and y. Leave your answers in simplest radical form.

85.



$x=3$

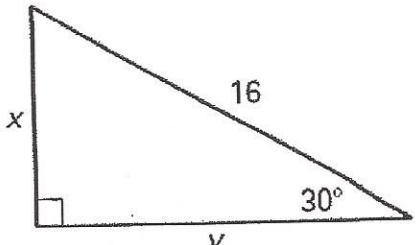
$y=3\sqrt{2}$

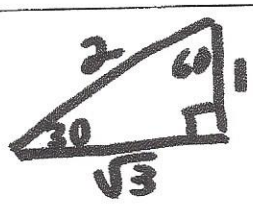
$\tan 45° = \frac{x}{3}$ $\cos 45° = \frac{3}{y}$

$1 = \frac{x}{3}$ $\frac{1}{\sqrt{2}} = \frac{3}{y}$

$x=3$ $y=3\sqrt{2}$

86.





$\sin 30° = \frac{x}{16}$ $\cos 30° = \frac{y}{16}$

$\frac{1}{2} = \frac{x}{16}$ $\frac{\sqrt{3}}{2} = \frac{y}{16}$

$x=8$ $y=8\sqrt{3}$

Convert the degree measure to radians or the radian measure to degrees.

87. $-\frac{3\pi}{4} \cdot \frac{180^\circ}{\pi} = -135^\circ$

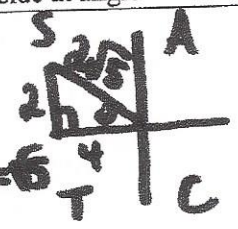
88. $390^\circ \cdot \frac{\pi}{180} = \frac{13\pi}{6}$

89. $\frac{15\pi}{8} \cdot \frac{180^\circ}{\pi} = 337.5^\circ$

90. $85^\circ \cdot \frac{\pi}{180} = \frac{17\pi}{36}$

Use the given point on the terminal side at angle θ in standard position to evaluate the six trigonometric functions of θ.

91. $(-4, 2)$



$\sin\theta = \frac{2}{2\sqrt{5}} = \frac{\sqrt{5}}{5}$ $\csc\theta = \sqrt{5}$

$\cos\theta = \frac{-4}{2\sqrt{5}} = -\frac{2\sqrt{5}}{5}$ $\sec\theta = -\frac{\sqrt{5}}{2}$

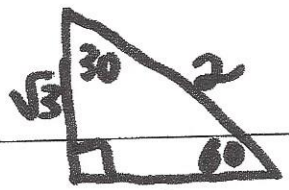
$\tan\theta = \frac{-2}{4} = -\frac{1}{2}$ $\cot\theta = -2$

92. $(-1, -2)$

$\sin\theta = \frac{-2}{\sqrt{5}} = -\frac{2\sqrt{5}}{5}$ $\csc\theta = -\frac{\sqrt{5}}{2}$

$\cos\theta = \frac{-1}{\sqrt{5}} = -\frac{\sqrt{5}}{5}$ $\sec\theta = -\sqrt{5}$

$\tan\theta = 2$ $\cot\theta = \frac{1}{2}$



Evaluate the function. Leave your answer in simplest radical form.

93. $\sin(-120^\circ)$

$\sin 60^\circ = \frac{-\sqrt{3}}{2}$

94. $\cos(-405^\circ)$

$\cos 45^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

95. $\cot(315^\circ)$

$\cot 45^\circ = 1$

96. $\sec(210^\circ)$

$\sec 30^\circ = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

-1

Evaluate the expression. Give your answer in both radians and degrees.

97. $\cos^{-1}\left(\frac{1}{2}\right)$

$\theta = 60^\circ$ $\frac{\pi}{3}$

98. $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

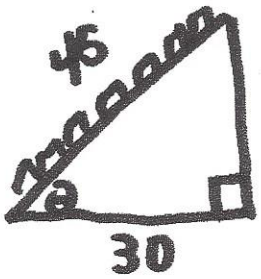
S | A
T | C

$\theta = 225^\circ$ $\frac{5\pi}{4}$

or

315° $\frac{7\pi}{4}$

99. An escalator ascends 45 feet over a horizontal distance of 30 feet. What is the angle of elevation? Round 2 places.

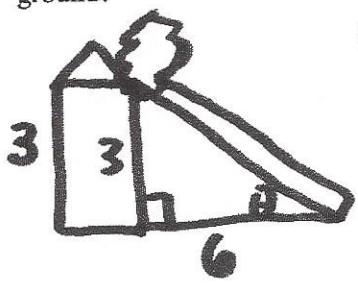


$\cos\theta = \frac{30}{45}$

$\theta = \cos^{-1}\left(\frac{30}{45}\right)$

$\theta = 48.19^\circ$

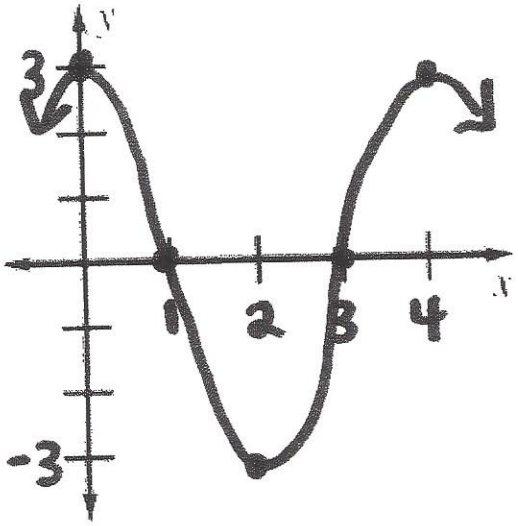
100. A storm knocked over a tree onto a 3 meters tall garage. The base of the tree is 6 meters from the garage. What is the angle of elevation that the tree makes with the ground? Round 2 places



$\theta = \tan^{-1}\left(\frac{3}{6}\right)$

$\theta = 26.57^\circ$

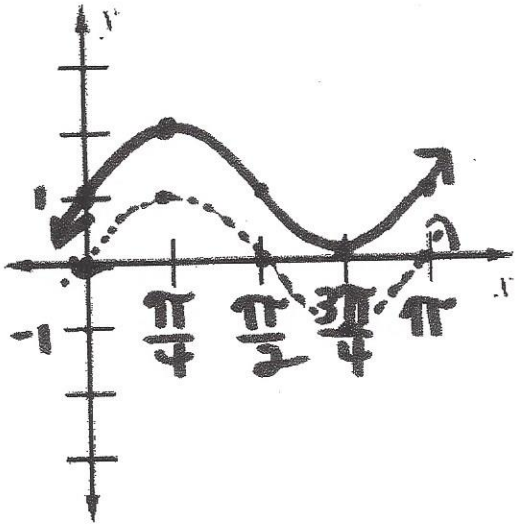
101. $y = 3\cos\left(\frac{\pi}{2}x\right)$



$\frac{2\pi}{\frac{\pi}{2}}$

Amplitude: 3 Period: 4

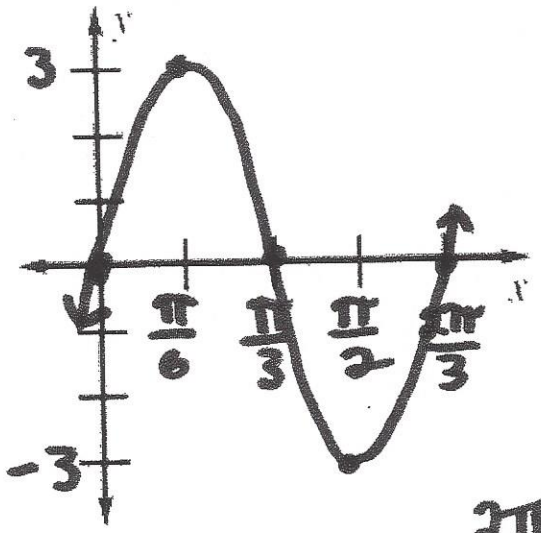
102. $y = 1 + \sin(2x)$



up 1

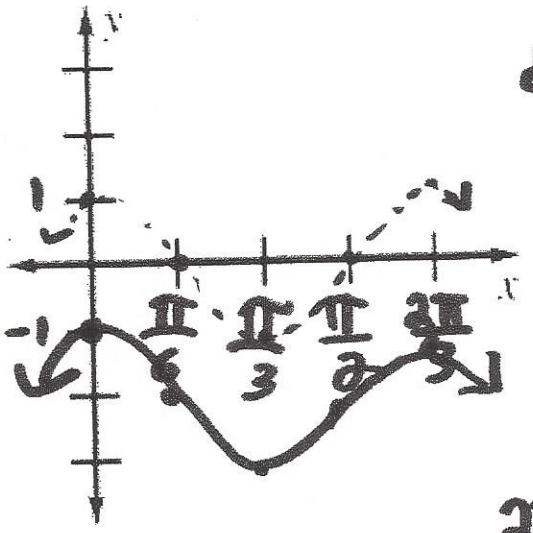
Amplitude: 1 Period: π

103. $y = 3\sin(3x)$



Amplitude: 3 Period: $\frac{2\pi}{3}$

104. $y = -2 + \cos(3x)$



down 2

Amplitude: 1 Period: $\frac{2\pi}{3}$

Write the equation of the graph described.

105. The graph of $y = \cos(2x) + 3$ translated down 1 unit and then reflected vertically.

$y = -\cos(2x) + 2$

106. The graph of $y = \frac{1}{4}\cos(2x)$ translated up 4 units and left π units.

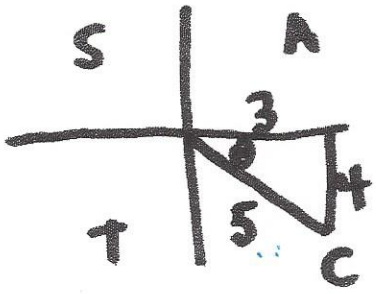
$y = \frac{1}{4}\cos 2(x+\pi) + 4$

107. The graph of $y = \frac{1}{2}\sin(4x)$ translated right $\frac{\pi}{2}$ units and down 4 units.

$y = \frac{1}{2}\sin 4\left(x - \frac{\pi}{2}\right) - 4$

Find the values of the other five trigonometric functions of θ, given:

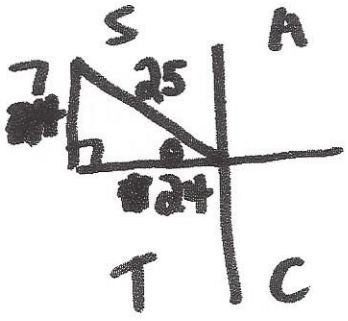
108. $\sec\theta = \frac{5}{3}, \frac{3\pi}{2} < \theta < 2\pi$



$\sin\theta = -\frac{4}{5}$ $\cos\theta = \frac{3}{5}$ $\tan\theta = -\frac{4}{3}$

$\csc\theta = -\frac{5}{4}$ $\cot\theta = -\frac{3}{4}$

109. $\csc\theta = \frac{25}{7}, \frac{\pi}{2} < \theta < \pi$



$\sin\theta = \frac{7}{25}$ $\cos\theta = -\frac{24}{25}$ $\tan\theta = -\frac{7}{24}$

$\sec\theta = -\frac{25}{24}$ $\cot\theta = -\frac{24}{7}$