Algebra and Trigonometry Supplement

Math 140-A

SECTION A.1 - NUMBERS

1. Counting numbers not including 0 $\{1, 2, 3, \cdots\}$ are called _____ numbers.

2. Counting numbers including 0 $\{0, 1, 2, 3, \cdots\}$ are called _____ numbers.

3. Positive and negative counting numbers with 0 are called _____.

4. Numbers that can be written in the form $\frac{a}{b}$, where a and b are integers with $b \neq 0$ are called _____ numbers.

5. Real numbers that cannot be expressed in the form $\frac{a}{b}$, where a and b are integers with $b \neq 0$ are called _____ numbers.

6. Show the given interval on a real number line.

A. $(2, 5)$	B. $[1, 4]$	C. $[-1, 2)$
D. $[3, \infty)$	E. $(-\infty, 1)$	F. $(-\infty, \infty)$
G. $[-2, \sqrt{2})$	H. $(1, \sqrt{3})$	I. $[\pi, \pi^2]$
J. $(-3, 0) \cup (0, 4]$	K. $(-1, 3) \cap [2, 7)$	L. $(-\infty, \frac{\pi}{2}) \cup (\pi, 2\pi)$

7. $\frac{7}{0}$ is _____.

8. $\frac{0}{7}$ is _____.

9. $\frac{0}{0}$ is _____.

SECTION A.2 - EXPONENTS

Simplify as much as possible. Write answers with nonnegative exponents only.

(Assume that all variables represent positive numbers.)

1. 3^{-2}

2. $\left(\frac{1}{3}\right)^2$

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

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

5. $(-2)^{-3}$

6. -2^{-3}

7. $(3x)^4$

8. $(x^2y^{-1})^7$

9. $\frac{(a+3)^4}{(a+3)^{-5}}$

10. $(x^{4/3})^{9/16}$

11. $x^{1/6}x^{1/5}$

12. $\frac{(3x)^{-1}}{3x^{-2}}$

13. $\frac{x+2}{x+7}$

14. $\frac{x}{x+y}$

15. $\left(\frac{7}{4}+\frac{1}{3}\right)^0$

16. $(ax)^3a^4x^2$

17. $\frac{a^5b^{-2}}{b^5}a^3$

18. $\frac{2x^2}{5y^5}\cdot\left(\frac{y^3}{x^2}\right)^2$

19. $\left(\frac{4c^3b^{-2}}{bc^{-1}}\right)^{-3}$

20. $\left(\frac{a^3b^{-2}c^3}{a^2b^{-5}c^{-2}}\right)^{-2}$

21. $(x^{n/2}\cdot x^{1/n}\cdot y^3)^{2n}$

22. $(a^rb^3)^2 \div (a^2b^{-3})^r$

23. $3x^4y\cdot\left(\frac{4y}{x}\right)^3$

24. $(x^{p+1})^2\cdot(x^3)^p\cdot x^{5p}$

25. $\left(\frac{3^6a^7x^0y^2}{ay^{-7}}\right)^{2/3}$

26. $\frac{-72a^2b^{-4}}{6a^3b^{-7}}$

27. $\left(\frac{8xy^3}{-4x^4y}\right)^{-3}$

28. $x^{-2}+x^{-3}$

29. $2x^{-2}+3x^{-1}$

30. $2y^{-3}+(2y)^{-3}$

SECTION A.3 - RADICALS

Change each of the following to simplist radical form and simplify as much as possible. (Assume that all variables represent positive numbers.)

1. $\sqrt{\frac{16}{25}}$
2. $-\sqrt{\frac{36}{49}}$
3. $\sqrt{-9}$
4. $\sqrt{\frac{19}{4}}$
5. $\sqrt{\frac{2}{3}}$
6. $\frac{\sqrt{3}}{\sqrt{7}}$
7. $\frac{3\sqrt{2}}{4\sqrt{3}}$
8. $\frac{5}{\sqrt[3]{2}}$
9. $\sqrt[3]{-1}$
10. $\sqrt[3]{-1}$
11. $\sqrt{\frac{2x}{5y}}$
12. $\sqrt[3]{\frac{7}{9x^2}}$
13. $\frac{\sqrt[3]{27}}{\sqrt[3]{4}}$
14. $\frac{\sqrt{27x^3y}}{\sqrt{3xy^3}}$
15. $\sqrt{\frac{7}{8x^2}}$
16. $\sqrt{4x^2+4y^2}$
17. $(\sqrt{2}+\sqrt{10})(\sqrt{2}-\sqrt{10})$
18. $(3+2\sqrt{x})(3-2\sqrt{x})$

For 19-23, simplify as much as possible.

19. $3\sqrt{20}-\sqrt{5}-2\sqrt{45}$
20. $\frac{3}{4}\sqrt{7}-\frac{2}{3}\sqrt{28}$
21. $\frac{3\sqrt{18}}{5}-\frac{5\sqrt{72}}{6}+\frac{3\sqrt{98}}{4}$
22. $4\sqrt[3]{24}-6\sqrt[3]{3}+13\sqrt[3]{81}$
23. $\sqrt{\frac{4}{3}}+\sqrt{27}-\frac{1}{2}\sqrt{243}$

SECTION A.3 - RADICALS (CONTINUED)

For 24-29, rationalize the DENOMINATOR.

24. $\dfrac{6}{\sqrt{3}+5}$

25. $\dfrac{x^2-3}{x-\sqrt{3}}$

26. $\dfrac{x-1}{1-\sqrt{x}}$

27. $\dfrac{\sqrt{3}}{2\sqrt{5}+4}$

28. $\dfrac{2}{\sqrt{x}+5\sqrt{3}}$

29. $\dfrac{\sqrt{x}+1}{2\sqrt{x}-3\sqrt{y}}$

For #30-33, rationalize the NUMERATOR.

30. $\dfrac{x+\sqrt{13}}{x^2-13}$

31. $\dfrac{\sqrt{x+h}-\sqrt{x}}{h}$

32. $\dfrac{\sqrt{x}-\sqrt{5}}{x^2-25}$

33. $\dfrac{\dfrac{1}{\sqrt{x+h}}-\dfrac{1}{\sqrt{x}}}{h}$

Hint for #33: First multiply by $\dfrac{(\sqrt{x+h})(\sqrt{x})}{(\sqrt{x+h})(\sqrt{x})}$.

SECTION A.4 - FACTORING

Factor completely each of the following.

1. $6x + 15y$
2. $12x^3 - 10x^2$
3. $4x^4 + 8x^3$
4. $3x^2y^4 + 7xy^6$
5. $x^2 - y^2$
6. $x^2 - 16$
7. $x^2 + 4$
8. $x^2 - 100$
9. $n^4 - 81$
10. $9x^2 - 36$
11. $4x^2 - 36$
12. $x^3 - 25x$
13. $x^2 - 9x + 8$
14. $x^2 + 10x + 9$
15. $x^2 + 17x + 16$
16. $x^2 - (a+1)x + a$
17. $x^2 + (a+1)x + a$
18. $a^2 + 10a + 24$
19. $w^2 + 10w + 21$
20. $21x^2 + 2x - 8$
21. $8x^2 + 2x - 15$
22. $12x^2 - 2x - 2$
23. $2x^2 - 8x - 10$
24. $9x^2 - 9x - 28$
25. $20x^2 + 39x + 18$
26 $10ax^2 + 7ax + a$
27. $x^3 - y^3$
28. $x^3 - 8a^3$
29. $16x^2 - 56x + 49$
30. $x^3 + y^3$
31. $x^4 - 16y^4$
32. $20x^2 + 7x - 3$
33. $10x^3 + 15x^2 + 20x$
34. $2x^2 + 11x + 5$
35. $10x^2 - 17x + 3$
36. $4x^2 + 12x + 9$
37. $4x^2 - 4x - 15$
38. $3x^4 - 81x$
39. $2n^3 + 14n^2 + 20n$

SECTION A.4 - FACTORING (CONTINUED)

40. $6k^3 + 31k^2 + 5k$

41. $ax + 4x + ay + 4y$

42. $ac - ad - bc + bd$

43. $x^2 - 9x + 20$

44. $x^2 + x - 6$

45. $2x^2 - 7x - 4$

46. $12x^2 + 19x - 21$

47. $6x^2 + 11x - 10$

48. $6x^2 + 17x + 12$

49. $8x^3 + 14x^2 - 15x$

50. $36x^4 + 36x^3 + 8x^2$

51. $48x^5 - 28x^4 - 10x^3$

52. $(x+1)^{100} + x[100(x+1)^{99}]$

53. $30x^3(3x^2+2)^4 + 2x(3x^2+2)^5$

54. $4(x+1)^3(2x+3)^5 + (x+1)^4 \cdot 5(2x+3)^4(2)$

SECTION A.5 - FRACTIONS

Reduce to lowest terms.

1 $\dfrac{x^2-5x+6}{x^2-7x+10}$

2. $\dfrac{a^2-4b^2}{a^3-8b^3}$

3. $\dfrac{x^2-x-12}{8+2x-x^2}$

4. $\dfrac{2x^3-3x^2-2x}{6x^4-5x^3-4x^2}$

For #5-20, simplify as much as possible.

5. $\dfrac{1}{x^2-5x+6}-\dfrac{2}{x^2-4x+3}$

6. $\dfrac{x-2}{x^2+x}-\dfrac{4}{x+1}+\dfrac{3x}{x^2-1}$

7. $\dfrac{x}{x-y}+\dfrac{y}{y-x}+1$

8. $\dfrac{x-1}{(x+1)^3}+\dfrac{x}{(x+1)^2}-\dfrac{1}{x+1}$

9. $\dfrac{8}{2a-3}+\dfrac{5}{3-2a}-\dfrac{3a-4}{2a^2-a-3}$

10. $\dfrac{x^2-y^2}{3x}\cdot\dfrac{2(x+y)}{x^2+2xy+y^2}$

11. $\dfrac{r^2-s^2}{s^3-16r^2s}\cdot\dfrac{s^2-4rs}{s-r}$

12. $\left(x+\dfrac{xy}{x-y}\right)\cdot\left(y-\dfrac{xy}{x+y}\right)$

13. $(a^2-b^2)\div\left(\dfrac{1}{b}-\dfrac{1}{a}\right)$

14. $\dfrac{x^2+2ax}{x^2+4a^2}\div\dfrac{x^2-4a^2}{ax-2a^2}$

15. $\dfrac{1}{t^2}\left(t-\dfrac{1}{t}\right)\cdot\dfrac{t^3}{t-1}\div\left(1+\dfrac{1}{t}\right)$

16. $\dfrac{1-\dfrac{1}{a}-\dfrac{12}{a^2}}{1-\dfrac{6}{a}+\dfrac{8}{a^2}}$

17. $\dfrac{\dfrac{x}{x-2}-1}{1+\dfrac{x}{2-x}}$

18. $\dfrac{\dfrac{2}{9-x^2}}{\dfrac{1}{3-x}-\dfrac{1}{3+x}}$

19. $\dfrac{\dfrac{x}{2}-\dfrac{4}{x^2}}{1+\dfrac{4}{x^2+2x}}$

20. $\dfrac{\dfrac{-1}{y-2}+\dfrac{5}{x}}{\dfrac{3}{x}-\dfrac{4}{xy-2x}}$

SECTION A.6 - SOLVING EQUATIONS

Solve the following for x or y.

1. $5x + 8 = 2x + 17$
2. $4y - 3 = 6(y + 4)$
3. $2(2 - x) + 3(3 - x) = 18$
4. $3(a - x) = 11a + x$
5. $y - 5 = m(2y - 10)$
6. $(x - 1)(x - 3) = x(x + 2)$
7. $x^2 + 6 = 5x$
8. $x(x - 1) = 20$
9. $(a + b)x = ab + (a - b)x$
10. $6(y^2 - 1) = 35y$
11. $x^3 + x^2 - 2x = 0$
12. $4x^2 - 9x^4 = 0$
13. $x^4 - 13x^2 + 36 = 0$
14. $9x^2 + 3x = 2$
15. $x^3 - 2x^2 - 4x + 8 = 0$

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16. Solve $\frac{3}{x} - \frac{4}{b} = \frac{5}{3b}$ for x.
17. Solve $m = \frac{c(1 - p)}{1 - d}$ for p.
18. Solve $pv = k\left(1 + \frac{t}{m}\right)$ for t.
19. Solve $x = \frac{3y + 5}{1 - 2y}$ for y.
20. Solve $x = \frac{y - 17}{4y} + \frac{3y + 1}{2y}$ for y.

Solve the following equations (#21-26) for x in three different ways. (I. Factoring, II. Quadratic formula, AND III. Completing the square.)

21. $x^2 - 9x + 14 = 0$
22. $2x^2 - 5x = 12$
23. $12x^2 - 5x - 3 = 0$
24. $x^2 + x - 6 = 0$
25. $2x^2 - 7x - 4 = 0$
26. $6x^2 + 11x - 10 = 0$

Solve the following (#27-33) by any method.

27. $(x - 3)^2 = 7$
28. $2x^2 - 5x = 3$
29. $x^2 + 1 = -x$
30. $(x + 3)(x - 2) = 0$
31. $(x + 3)(x - 2) = 1$
32. $3(2x + 3)^2 = 12$
33. $x^4 - 13x^2 + 36 = 0$ HINT: Try the substitution $u = x^2$.

SECTION A.7 - SOLVING EQUATIONS

Find the solution set for each equation. (Use any method.)

1. $x^2 + 4x + 3 = 0$

2. $n^2 - 13n + 36 = 0$

3 $s^2 - 4s = 21$

4. $4t^2 - 19t - 30 = 0$

5. $3t(t-4) = 0$

6. $a(a-1) = 2$

7. $3w^3 - 24w^2 + 36w = 0$

8. $16 - x^4 = 0$

9. $2x^3 = 50x$

10. $3x^2 = 75$

11. $7x^2 + 62x - 9 = 0$

12. $-3x^2 - 19x + 14 = 0$

13. $9x^4 - 37x^2 + 4 = 0$

14. $x^4 - 9x^2 = 0$

15. $5x(3x-2) = 0$

16. $2x^2 - x + 7 = 0$

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17 $\dfrac{x+1}{4} + \dfrac{x-2}{6} = \dfrac{3}{4}$

18. $\dfrac{7}{2x} + \dfrac{3}{5} = \dfrac{2}{3x}$

19 $n + \dfrac{1}{n} = \dfrac{17}{4}$

20 $\dfrac{a}{a-2} + \dfrac{2}{3} = \dfrac{2}{a-2}$

21 $\dfrac{5}{7x-3} = \dfrac{3}{4x-5}$

22. $\dfrac{x}{x+1} - 2 = \dfrac{3}{x-3}$

23. $-1 + \dfrac{2x}{x+3} = \dfrac{-4}{x+4}$

24. $\dfrac{2x}{x-2} + \dfrac{15}{x^2-7x+10} = \dfrac{3}{x-5}$

Section A.8 - Circles and Parabolas

Find the vertex of the parabola, by completing the square. Sketch the graph using the vertex and any intercepts.(1-6)

1. $y = x^2 - 6x + 13$
2. $y = x^2 + 7x + 14$
3. $y = 2x^2 - x + 2$
4. $y = 3x^2 + 18x + 25$
5. $y = x^2 - 8x + 18$
6. $y + 2x^2 + 4x + 5 = 0$

Find the center and radius of the circle by completing the square. Then sketch the graph. (7-10)

7. $x^2 + y^2 - 2x - 6y - 6 = 0$
8. $x^2 + y^2 - 16x + 6y - 71 = 0$
9. $x^2 + y^2 + 8x - 6y + 24 = 0$
10. $9x^2 + 9y^2 - 6x - 12y - 31 = 0$

Section A.9 - Absolute Values and Inequalities

Find the solution set for the following.

1. $3x + 23 \leq -7$
2. $-5x - 18 < 42$
3. $-ax + b > c$ (Assume a,b,c are positive)
4. $x^2 - 3x \geq 4$
5. $\dfrac{2x}{x-2} \geq 3$
6. $\dfrac{1}{x} \leq \dfrac{1}{x+1}$
7. $\dfrac{1+3x}{2x} \geq -2$
8. $\dfrac{x}{x+1} > 1$
9. $\dfrac{(x+1)^2}{(x-2)^3} < 0$
10. $\dfrac{(x-2)^2(3x+1)^3(3x-1)}{\left(x-\frac{1}{4}\right)^6} \geq 0$

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11. $|x| < 3$
12. $|x| > 3$
13. $|x-2| \leq 3$
14. $|x-2| > 3$
15. $|x+2| \leq 3$
16. $|3x+5| < 17$
17. $|3x+5| > 17$
18. $|3x+5| = 17$
19. $|3x+5| = -17$
20. $2|x-3| \leq 4$
21. $7 + \left|\dfrac{x-4}{3}\right| < 16$
22. $2 + 3|4x+1| = 8$

SECTION A.10 - EQUATIONS OF LINES

Find the equation of the line passing through each pair of points.

1. $(1,3)$, $(3,7)$ 2. $(-1,8)$, $(2,-1)$ 3. $(0,-4)$, $(10,1)$

Find the equation of the line that satisfies the given information. (4-11) (Write equation in slope-intercept form)

4. Passes through $(-2,5)$; $m=-3$.

5. Passes through $(-1,4)$; $m=\frac{1}{3}$.

6. Slope -4 ; $y-$ intercept 7 .

7. Slope -4 ; $x-$ intercept 7 .

8. Passes through $(0,-1)$ and has the same x -intercept as the line $-2x+y=1$.

9. Parallel to $2x-5y=10$ and passes through $(-1,2)$.

10. Perpendicular to $4y-3x=17$ and passes through $(4,0)$.

11. Tangent to the graph of the circle $x^2+y^2=25$ at the point $(3,4)$.

Graph the following equations. (12-16)

12. $y+2x=5$ 13. $2y=3x-10$

14. $5x+3y=11$ 15. $y=3$

16. $x=-2$

Find the slope between each pair of points. (17-22)

17. $(x,3x)$ and $(x+h,3(x+h))$ 18. $(x,-2x+17)$ and $(x+h,-2(x+h)+17)$

19. (x,x^2) and $(x+h,(x+h)^2)$ 20. (x,x^3) and $(x+h,(x+h)^3)$

21. (x,x^4) and $(x+h,(x+h)^4)$ 22. $\left(x,\frac{1}{x}\right)$ and $\left(x+h,\frac{1}{x+h}\right)$

SECTION A.11 - FUNCTIONS

Specify the domain of the function (#1-3) and then graph the equation by simplifying it first. Remember that if you cancel a term, the domain should remain the same.

1. $y = \dfrac{x^2 + x - 20}{x - 4}$ 2. $y = \dfrac{x^2 - 4}{(x+2)(2-x)}$ 3. $y = \dfrac{x^2 - 5x}{x - 5}$

For #4-9, find the $x-$ intercept(s) and $y-$ intercept (if they exist).

4. $y = x^2 + 2x + 3$ 5. $y = x^2 - 6x + 9$ 6. $y = \dfrac{x^2 - 3x + 2}{x}$

7. $y = \dfrac{3x^2 + 7}{2x + 5}$ 8. $y = \dfrac{x^2 - 4}{x + 3}$ 9. $\dfrac{x^3 - 1}{x^2 + 3}$

10. Test the six "important" graphs for the three types of symmetry.

For #11-16, find $\dfrac{f(x+h) - f(x)}{h}$.

11. $f(x) = 3x - \dfrac{11}{3}$ 4. $f(x) = -4x + 3$

13. $f(x) = x^2 + 1$ 14. $f(x) = x^2 + x + 1$

15. $f(x) = x^5 + 2$ (Pascal's Δ) 16. $f(x) = \dfrac{1}{x}$

17. For the six "important" functions, determine which of them have inverses by using the horizontal line test. For the ones that have inverses, find the inverse.

18. If $g(x) = \dfrac{x+2}{x-3}$, then $g^{-1}(x) =$

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

a. Find domain of f .
b. Find range of f .
c. Find f^{-1} .
d. Find domain of f^{-1} .
e. Find range of f^{-1} .
f. What is the relationship between the answers to a and b and the answers to d and e?

SECTION A.12 - MORE ON FUNCTIONS

Find the domain of each function. Then find all horizontal and vertical asymptotes.

1. $\dfrac{1}{x+4}$

2. $\dfrac{2x-6}{x^2-9}$

3. $\dfrac{7x+2}{x-3}$

4. $\dfrac{5x(x-3)(x+1)}{7x(x-1)(2x-3)}$

5. $\dfrac{x^3-1}{x^2-1}$

6. $\dfrac{7x^2+1}{3x^2+4}$

Find the degree of the following polynomials or state that the function is not a polynomial.

7. $3x^2+4x+3$

8. 2

9. $x^5-2x+\sqrt{x}$

10. $x^{-2}+6x+1$

11. $x^{17000}+\pi x^{73}-\sqrt{\pi}$

12. $\dfrac{1}{x}$

Determine any symmetry of the following functions. (13-15)

13. $y=x^3+20$

14. $y=\dfrac{x^5-x}{x^2+1}$

15. $y=\dfrac{x^4+1}{x^2-5}$

For #16-22, $f(x)=x^2+1$ and $g(x)=x^3+5$.

16. A) $(f+g)(x)=$ B) $(g+f)(x)=$

17. A) $(f-g)(x)=$ B) $(g-f)(x)=$

18. A) $(f\cdot g)(x)=$ B) $(g\cdot f)(x)=$

19. A) $(f/g)(x)=$ B) $(g/f)(x)=$

20. A) $(f\circ g)(x)=$ B) $(g\circ f)(x)=$

21. In #16-20, which pairs are equal?

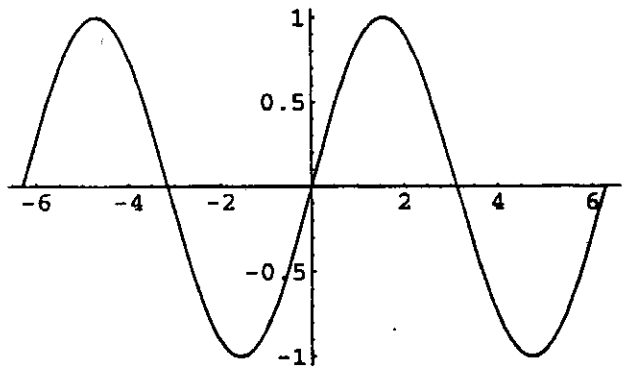
22. A) $f^{-1}(x)=$ B) $g^{-1}(x)=$

Section A.13 - Trig Graphs

$$y = \sin x$$

Domain: $(-\infty, \infty)$
Amplitude: 1
x-intercepts: $0, \pm\pi, \pm 2\pi, \ldots$

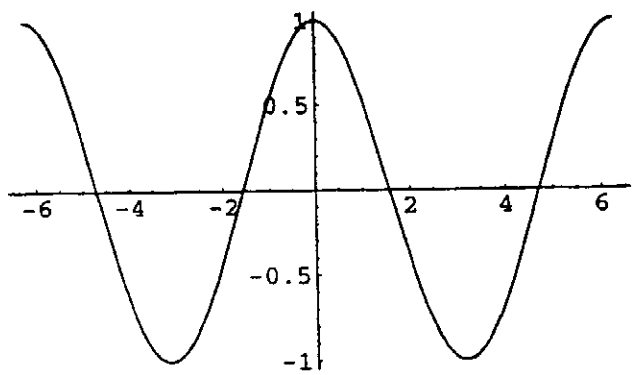
Range: $[-1, 1]$
Period: $2\ \pi$
y-intercept: 0



$$y = \cos x$$

Domain: $(-\infty, \infty)$
Amplitude: 1
x-intercepts: $\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots$

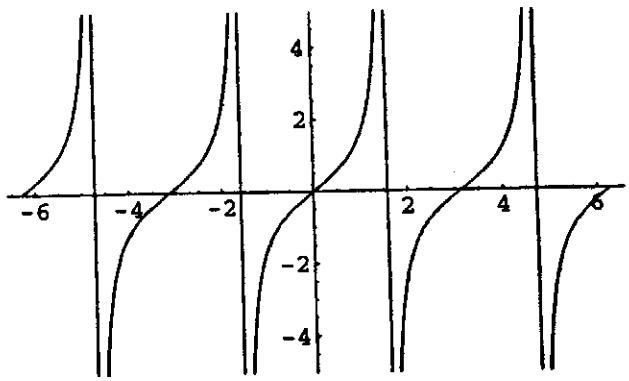
Range: $[-1, 1]$
Period: $2\ \pi$
y-intercept: 1



SECTION A.13 - TRIG GRAPHS (CONTINUED)

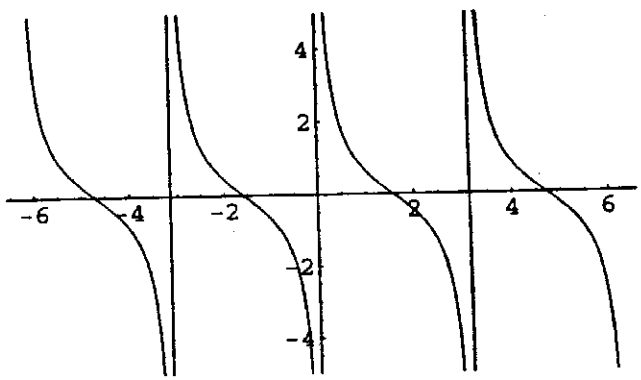
$$y = \tan x$$

Domain: all reals except $\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots$ Range: all reals
Period: π
x-intercepts: $0, \pm\pi, \pm 2\pi, \ldots$ y-intercept: 0



$$y = \cot x$$

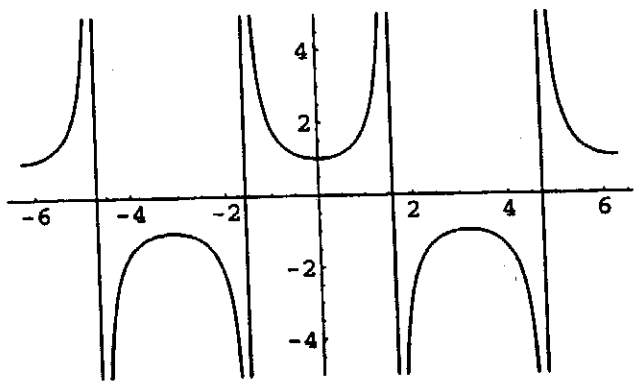
Domain: all reals except $0, \pm\pi, \pm 2\pi, \ldots$ Range: all reals
Period: π
x-intercepts: $\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots$ y-intercepts: NONE



SECTION A.13 - TRIG GRAPHS (CONTINUED)

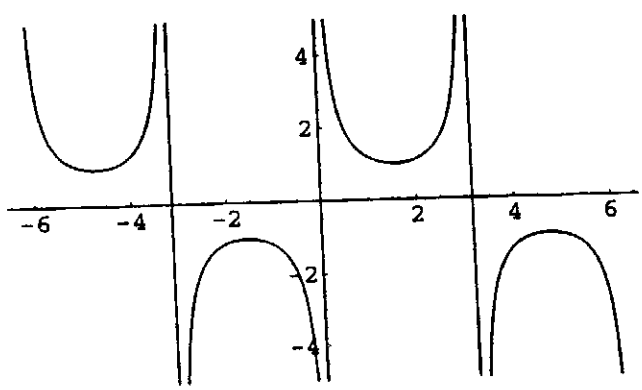
$$y = \sec x$$

Domain: all reals except $\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots$ Range: $(-\infty, -1] \cup [1, \infty)$
Period: 2π
x-intercepts: NONE y-intercepts: 1



$$y = \csc x$$

Domain: all reals except $0, \pm\pi, \pm 2\pi, \ldots$ Range: $(-\infty, -1] \cup [1, \infty)$
Period: 2π
x-intercepts: NONE y-intercept: NONE



SECTION A.14 - TRIG

1. Express in radians (between 0 and 2π) using fractional multiples of π :

$30°$, $45°$, $60°$, $90°$, $120°$, $210°$, $135°$, $270°$, $300°$, $-120°$

2. Express the following in degrees (between $0°$ and $360°$):

$\frac{\pi}{3}$, $\frac{\pi}{2}$, $\frac{3\pi}{4}$, $\frac{7\pi}{6}$, $\frac{11\pi}{6}$, $-\frac{\pi}{3}$, $\frac{5\pi}{3}$, $\frac{-5\pi}{4}$

3. Find the length of the smaller arc intercepted by a central angle of $120°$ in a circle of radius 5.

4. Find the area of the smaller sector determined by a central angle of $120°$ in a circle of radius 7.

5. If θ is an acute angle with $\sin\theta = \frac{4}{5}$, find the other trig values for θ .

6. If θ is an obtuse angle with $\sin\theta = \frac{4}{5}$, find the other trig values for θ .

Evaluate the following: (7-16)

7. $\sin\frac{\pi}{6}$ 8. $\cos\frac{\pi}{6}$ 9. $\tan\frac{\pi}{6}$ 10. $\tan\frac{2\pi}{3}$ 11. $\csc\frac{5\pi}{4}$

12. $\cos\frac{5\pi}{6}$ 13. $\tan\frac{\pi}{3}$ 14. $\sin\frac{-\pi}{2}$ 15. $\sec\frac{-3\pi}{4}$ 16. $\cot\frac{-7\pi}{6}$

Find the values of x between 0 and 2π such that:

17. $\sin x = \frac{\sqrt{3}}{2}$ 18. $\cos x = 0$ 19. $\tan x = -1$ 20. $\sec x = 2$

21. $\csc x = -\sqrt{2}$ 22. $\sin x = 0$ 23. $\cos x = -1$ 24. $\cos x = \frac{-\sqrt{2}}{2}$

25. $\cot x = \sqrt{3}$ 26. $\sin x = \frac{-1}{2}$

Simplify each expression.

27. $\frac{\cos(90° - x)}{\cos x}$ 28. $\frac{\sin^2 A - \cos^2 A}{\sin A - \cos A}$ 29. $\frac{3\sin w + 6}{\sin^2 w - 4}$ 30. $\sec A \csc A - \tan A - \cot A$

SECTION A.15 - TRIG (II)

1. Find all solutions of $2\sin^2 x - 7\sin x + 3 = 0$ on the interval $[0, 2\pi)$.

2. Final all solutions of $2 - 2\sin^2 x = 3\cos x$ on the interval $[0, 2\pi)$.

   Hint for #2: Replace $\sin^2 x$ with $(1 - \cos^2 x)$.

Simplify the following expressions.

3. $\sin 110° \cos 20° - \cos 110° \sin 20°$

4. $\cos\left(\frac{3\pi}{2} + \theta\right)$

5. $\sin\left(\frac{\pi}{4} + s\right) - \sin\left(\frac{\pi}{4} - s\right)$

6. $\tan\left(\frac{\pi}{4} - x\right)$

7. Express $\sin^2 x$ in a form that does not involve powers of the trigonometric functions (Hint: #2 of the double angle formulas.)

8. Express $\cos^2 x$ in a form that does not involve powers of the trigonometric functions (Hint: #2 of the double angle formulas.)

For #9 and 10, $\sin x = \frac{3}{5}$ and $\cos x = \frac{4}{5}$.

9. Compute $\sin 2x$.

10. Compute $\cos 2x$.

Evaluate the following:

11. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

12. $\tan^{-1} 1$

13. $\cos^{-1}\frac{1}{2}$

14. $\cos^{-1}(2\pi)$

15. $\tan\left[\sin^{-1}\left(\frac{4}{5}\right)\right]$

16. $\tan\left[\cos^{-1}\left(\frac{5}{13}\right)\right]$

17. $\cos\left[\sin^{-1}\left(\frac{2}{3}\right)\right]$

SECTION A.16 - EXPONENTIAL & LOGARITHMIC FUNCTIONS

Simplify.

1. $\log_5 25$
2. $\log_3 81$
3. $\log_3 \frac{1}{9}$
4. $\log_4 1$
5. $\log_5 0$
6. $\log_{64} 8$
7. $\ln \sqrt[5]{e}$
8. $e^{\ln 5}$
9. $\ln e^{7x+1}$

Solve the following for x .

10. $\ln e^x = 3$
11. $3^{x-1} = 4$
12. $4^x = 3^{2x+1}$
13. $\log_9 x = 0$
14. $\log_3 x = 2$
15. $\log_2 x = -7$
16. $xe^x - 2e^x = 0$
17. $\ln(x-5) + \ln 7 = 3$
18. $\log_4 x + \log_4(x-3) = 1$
19. $\frac{1}{3}\log_9 x = \frac{1}{2}$
20. $2^x = 100$

Using properties of logarithms, expand the following.

21. $\log_5 \frac{AB^2}{\sqrt{C}}$
22. $\log_{10} A^2B^3C^\pi$

23. Graph the function $f(x) = 5^x$ and then find $f^{-1}(x)$.

24. Graph the function $g(x) = \ln x$ and then find $g^{-1}(x)$.

SECTION A.17 - LONG DIVISION & SYNTHETIC DIVISION

Perform the following divisions of polynomials by polynomials.

1. $\dfrac{x^2 - 7x - 78}{x + 6}$

2. $\dfrac{2x^2 - x - 4}{x - 1}$

3. $\dfrac{15x^2 + 22x - 5}{3x + 5}$

4. $\dfrac{2x^3 + 9x^2 - 17x + 6}{2x - 1}$

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

6. $\dfrac{x^4 - 3x^2 + 4x - 5}{x^2 + x + 2}$

Use synthetic division to perform the following divisions.

7. $\dfrac{x^2 - 7x - 78}{x + 6}$

8. $\dfrac{2x^2 - x - 4}{x - 1}$

9. $\dfrac{15x^2 + 22x - 5}{3x + 5}$