

Section 1: Algebra Review

1. Solve $xy + 2x + 1 = y$ for y

2. Factor: $x^2(x - 1) - 4(x - 1)$

3. Solve $\ln(y - 1) - \ln = x + \ln x$ for y

4. Factor $3x^{\frac{3}{2}} - 9x^{\frac{1}{2}} + 6x^{-\frac{1}{2}}$

Simplify each expression.

5. $\frac{(x^2)^3 x}{x^7}$

6. $\sqrt{x} \cdot \sqrt[3]{x} \cdot x^{\frac{1}{6}}$

7. $\frac{5(x+h)^2 - 5x^2}{h}$

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

Simplify, by factoring first. Leave answers in factored form.

Example:

$$\begin{aligned}\frac{(x+1)^3(4x-9)-(16x+9)(x+1)^2}{(x-6)(x+1)} &= \frac{(x+1)^2[(x+1)(4x-9)-(16x+9)]}{(x-6)(x+1)} \\ &= \frac{(x+1)^2[4x^2-5x-9-16x-9]}{(x-6)(x+1)} \\ &= \frac{(x+1)^2[4x^2-21x-18]}{(x-6)(x+1)} \\ &= \frac{(x+1)^2[(4x+3)(x-6)]}{(x-6)(x+1)} \\ &= (x+1)(4x+3)\end{aligned}$$

9. $(x-1)^3(2x-3) - (2x+12)(x-1)^2$

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

Simplify by rationalizing the numerator.

Example:

$$\frac{\sqrt{x+4}-2}{x} = \frac{\sqrt{x+4}-2}{x} \cdot \frac{\sqrt{x+4}+2}{\sqrt{x+4}+2} = \frac{x+4-4}{x(\sqrt{x+4}+2)} = \frac{x}{x(\sqrt{x+4}+2)} = \frac{1}{\sqrt{x+4}+2}$$

11. $\frac{\sqrt{x+9}-3}{x}$

12. $\frac{\sqrt{x+h}-\sqrt{x}}{h}$

Solve each equation or inequality for x over the set of real numbers.

13. $2x^4 + 3x^4 - 2x^2 = 0$

14. $\frac{2x-7}{x+1} = \frac{2x}{x+4}$

15. $\sqrt{x^2 - 9} = x - 1$

16. $|2x - 3| = 14$

17. $x^2 - 2x - 8 < 0$ (answer in interval notation)

18. $\frac{3x+5}{(x-1)(x^4+7)} = 0$

Solve each system of equations algebraically and graphically.

$$19. \begin{cases} x + y = 8 \\ 2x - y = 7 \end{cases}$$

$$20. \begin{cases} y = x^2 - 3x \\ y = 2x - 6 \end{cases}$$

Section 2: Trigonometry Review

21. Use your knowledge of the unit circle, to evaluate each of the following. You MUST know your unit circle. Leave answers in radical form. Do NOT use your calculator.

a) $\sin 30^\circ$

b) $\cos \frac{2\pi}{3}$

c) $\tan 45^\circ$

d) $\sin\left(-\frac{\pi}{6}\right)$

e) $\tan \pi$

f) $\cos \frac{5\pi}{6}$

g) $\cos(90^\circ)$

h) $\cos \frac{3\pi}{4}$

i) $\cot \frac{\pi}{6}$

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

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

l) $\tan^{-1}(1)$

Solve each trigonometric equation for $0 \leq x \leq 2\pi$.

22. $\sin x = \frac{\sqrt{3}}{2}$

23. $\tan^2 x = 1$

24. $\cos \frac{x}{2} = \frac{\sqrt{2}}{2}$

25. $2 \sin^2 x + \sin x - 1 = 0$

26. $3 \cos x + 3 = 2 \sin^2 x$

Solve each exponential or logarithmic equation.

27. $5^x = 125$

28. $8^{x+1} = 16^x$

29. $81^{\frac{3}{4}} = x$

30. $8^{-\frac{2}{3}} = x$

31. $\log_2 32 = x$

32. $\log_x \frac{1}{9} = -2$

33. $\log_4 x = 3$

34. $\log_3(x + 7)x = \log_3(2x - 1)$

35. $\log x - \log(x - 3) = 2$

Expand each of the following using the law of logs.

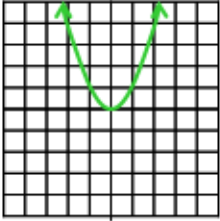
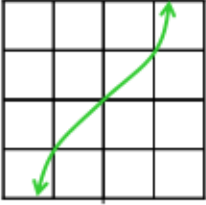
36. $\log_3 5x^3$

37. $\ln \frac{5x}{y^2}$

38. $2\ln\sqrt{y} - \frac{1}{2}\ln y^4 + \ln 2y$

Section 3: Graphing Review

I. Symmetry - Even/Odd Functions

Quick Review		
Even Function	Symmetric about the y axis $f(-x) = f(x)$ for all x	Example: $y = x^2$ 
Odd Function	Symmetric about the origin (equivalent to a rotation of 180 degrees) $f(-x) = -f(x)$ for all x	Example: $y = x^3$ 

To determine algebraically if a function is even, odd, or neither, find $f(-x)$ and determine if it is equal to $f(x)$, $-f(x)$, or neither.

Example: Determine if $f(x) = \frac{4x}{x^2+1}$ is even or odd.

$$f(-x) = \frac{4(-x)}{(-x)^2+1} = \frac{-4x}{x^2+1} = -\frac{4x}{x^2+1} = -f(x) \text{ Therefore, } f(x) \text{ is an odd function.}$$

Determine if the following functions are even, odd, or neither.

39. $f(x) = \frac{(x^2)}{x^4+3}$

40. $f(x) = \frac{x}{x+1}$

41. $f(x) = 1 + 3x^2 + 3x^4$

42. $f(x) = 1 + 3x^3 + 3x^5$

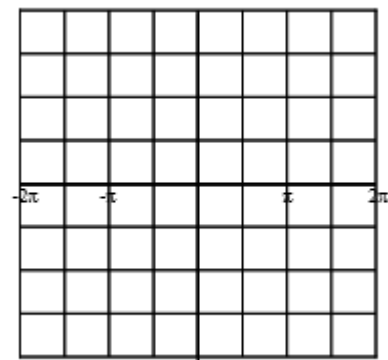
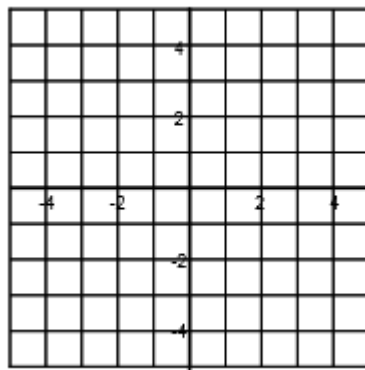
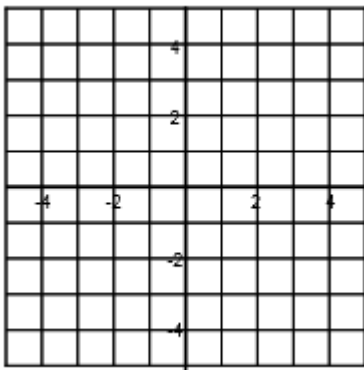
II. Essential Graphs

Sketch each graph. You should know the graphs of these functions.

43. $f(x) = \sqrt{x}$

44. $f(x) = x^3$

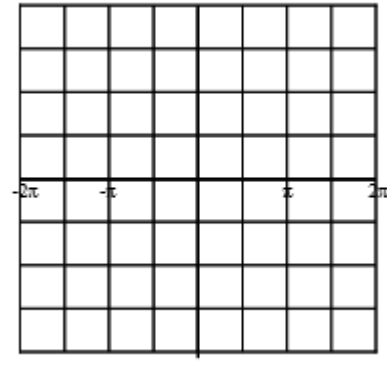
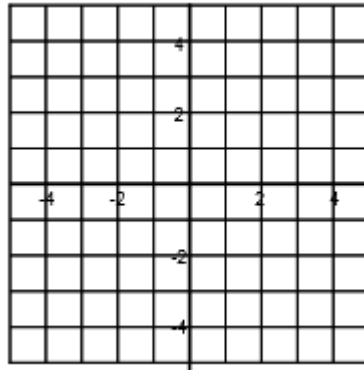
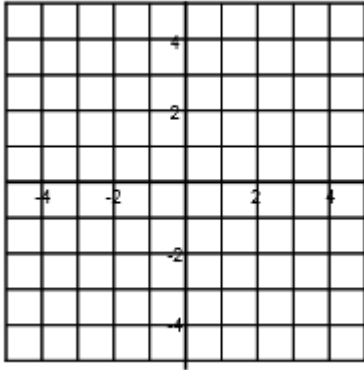
45. $f(x) = \sin x$



46. $f(x) = e^x$

47. $f(x) = \ln x$

48. $f(x) = \cos x$



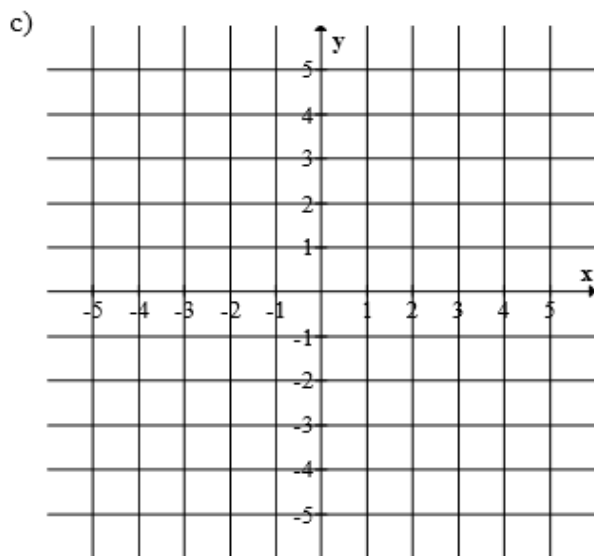
49. For each graph above, state the domain, range, x-intercept(s), y-intercept(s), and any asymptotes - you can write your answers under each graph.

50. For the following functions, find the a) domain, b) range, c) graph, and d) any symmetries.

1. $y = 4 - x^2$

a) _____

b) _____

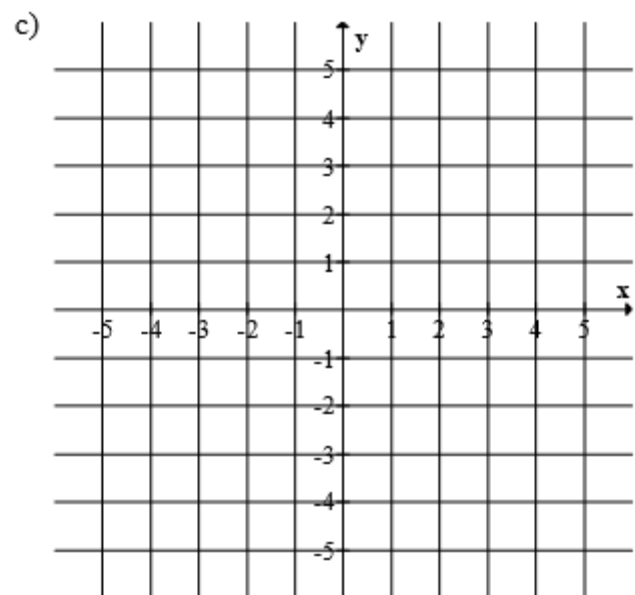


d) _____

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

a) _____

b) _____

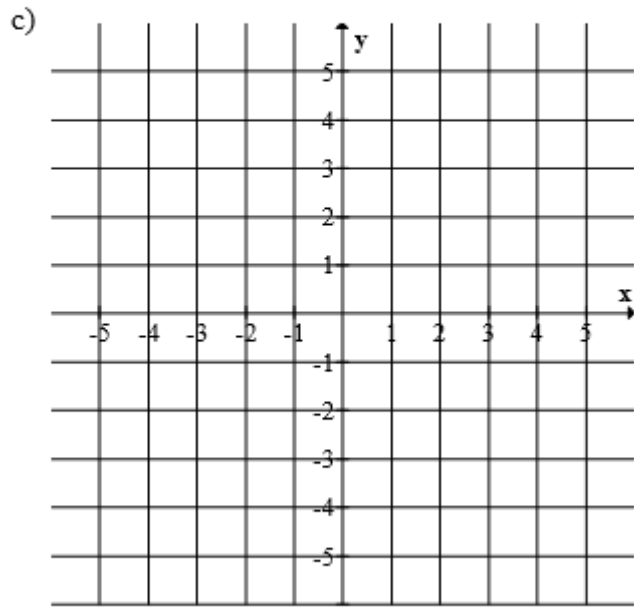


d) _____

3. $y = 1 + \frac{1}{x}$

a) _____

b) _____

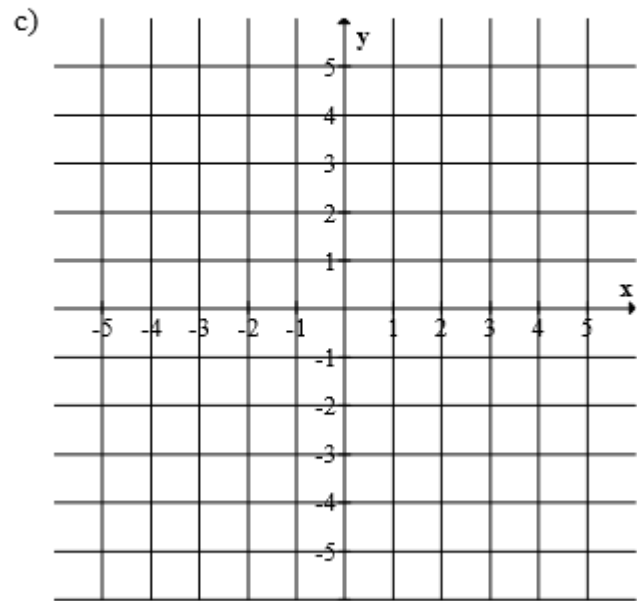


d) _____

4. $y = x^{2/3}$

a) _____

b) _____



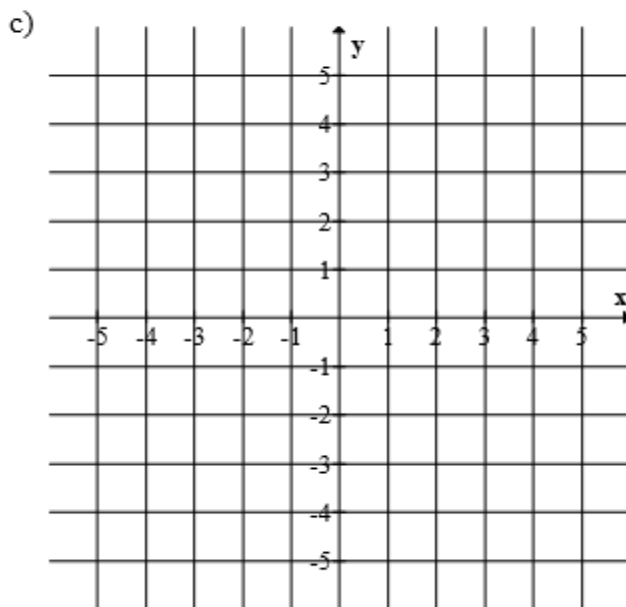
d) _____

51. For the following functions, find the a) domain, b) range, c) graph, and d) any symmetries.

1. $y = -2^x + 3$

a) _____

b) _____

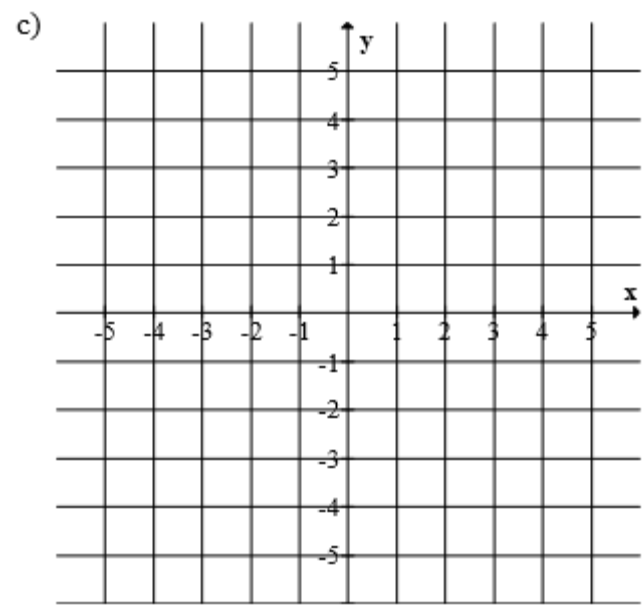


d) _____

2. $y = e^x + 3$

a) _____

b) _____



d) _____