PreCalculus Review

Sketch, then state the domain and range of the function in interval notation. Also, state the x and y intercepts, if any.

1. $f(x) = (x+1)^3$
2. $f(x) = -\sqrt{x-1} - 4$
3. $f(x) = 1 + x^{-1}$
4. $f(x) = \begin{cases} 1 - x^2 & x \le 0 \\ x + 2 & x > 0 \end{cases}$
5. $f(x) = \log_2 x$
6. $f(x) = x^2 - x - 2$
7. $f(x) = 2^{-x}$
8. $f(x) = \dfrac{x-2}{x^2-4}$
9. $f(x) = \dfrac{|x|}{x}$

Solve.

10. $2x^2 + 4x + 1 = 0$
11. $2x^3 - 3x^2 - 11x + 6 = 0$
12. $\log_6(x+5) + \log_6 x = 2$
13. $x^3 - 10x - 12 = 0$
14. $5^{2x-1} = \dfrac{1}{125}$
15. $x^2 - x - 12 = 0$
16. $\sqrt{x+10} = x - 2$
17. $\ln\sqrt{x+1} = 1$
18. $(x-4)^{2/3} = 16$

Solve and graph the solution set on a number line. State the solution in interval notation.

19. $3x^2 + 10x - 8 \le 0$
20. $6x^2 + x > 1$

Perform the indicated operation.

21. $\dfrac{3x}{x^2+2x} - \dfrac{1}{2x}$
22. $(x^3 - x - 1) \div (x+2)$

Factor completely. If possible, simplify the factors.

23. $x^4 + 27x$
24. $2x^3 + 5x^2 - 12x$
25. $3x(x+4) - 5(x+4)^2$
26. $3x^{3/2} - 9x^{1/2} + 6x^{-1/2}$
27. $(x+5)^{-1/2} - (x+5)^{-3/2}$

Find f(3), f(-3) and f(-x). Is the function even, odd, or neither?

28. $f(x) = x^5 + x^3 - x$
29. $f(x) = |x| - 1$
30. $f(x) = x\sqrt{x^2+2}$

Let f(x) = 2x-1 and g(x) =1/x. Find each value.

31. f(g(7))
32. g(f(7))
33. $\dfrac{f(x+h) - f(x)}{h}$
34. $\dfrac{g(x+h) - g(x)}{h}$

Use the given conditions to write an equation for each line in point-slope and slope-intercept form.

35. A line with slope 1/3 passing through (3,5)
36. A line passing through the points (2,-3) and (-1, 4)
37. A line perpendicular to a line passing through (3,-4) and (5, 2)
38. A line with x-intercept -1/2 and y-intercept 4.

Solve each system.

39. $3x - 2y = -5$
$4x + y = 8$

40. $3x = 4y + 1$
$3y = 1 - 4x$

Expand each logarithm. When possible, evaluate logarithmic expressions.

41. $\log \dfrac{\sqrt{x}y^3}{100z^3}$

42. $\ln \sqrt[5]{e^3 x^2 y^4}$

Condense each logarithm. When possible, evaluate logarithmic expressions.

43. $\log_2 96 - \log_2 3$

44. $\ln(x^2 - 9) - \ln(x + 3) + 3\ln x$

Find the exact value of each expression.

45. $\sec \dfrac{5\pi}{4}$

46. $\csc \dfrac{5\pi}{3}$

47. $\tan \dfrac{5\pi}{6}$

48. $\cos^{-1}\left(-\dfrac{1}{2}\right)$

49. $\cot^{-1} 1$

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

51. $\cos\left(\tan^{-1}\dfrac{3}{4}\right)$

52. $\csc\left(\cot^{-1}\sqrt{3}\right)$

Solve each equation over the interval $[0,2\pi)$

53. $2\sin^2 x - \sin x - 1 = 0$

54. $\sin^2 x + \cos x + 1 = 0$

55. $\sin 2x = \cos x$

56. $\csc 2x + 2 = 0$

Simplify each trigonometric expression.

57. $\dfrac{\tan\theta\cos\theta}{\sin\theta\sec\theta}$

58. $\sin^3\theta + \sin\theta\cos^2\theta$

Sketch the function over the interval $[0,2\pi)$ ***and state the domain.***

59. $f(x) = \sin\dfrac{\pi x}{2} - 1$

60. $f(x) = 2\sec x$