

Calculus Ch. 2 Review

key

7. Let $f(x) = 5x^2 - 3$ and $g(x) = -x^2 + 4x + 1$. Find the following.

a. $f(-2)$ b. $g(3)$ c. $f(-k)$ d. $g(3m)$

e. $f(x+h)$ f. $g(x+h)$ g. $\frac{f(x+h) - f(x)}{h}$ h. $\frac{g(x+h) - g(x)}{h}$

a) $f(-2) = \boxed{17}$ b) $g(3) = \boxed{4}$ c) $f(-k) = \boxed{5k^2 - 3}$ d) $g(3m) = \boxed{-9m^2 + 12m + 1}$

e) $F(x+h) = \boxed{5x^2 + 10xh + 5h^2 - 3}$ f) $g(x+h) = \boxed{-x^2 - 2xh - h^2 + 4x + 4h + 1}$

g) $\frac{5x^2 + 10xh + 5h^2 - 3 - (5x^2 - 3)}{h} = \boxed{10x + 5h}$ h) $\frac{-x^2 - 2xh - h^2 + 4x + 4h + 1 - (-x^2 + 4x + 1)}{h} = \boxed{-2x - h + 4}$

Find the domain of each function defined as follows.

9. $y = \ln(x+7)$

$$\begin{aligned} x+7 > 0 \\ x > -7 \end{aligned}$$

10. $y = \ln(x^2 - 16)$

$$\begin{aligned} x^2 - 16 &> 0 \\ x^2 &> 16 \\ x &\leq -4 \\ x &\geq 4 \end{aligned}$$

11. $y = \frac{3x - 4}{x}$

$$\boxed{x \neq 0}$$

12. $y = \frac{\sqrt{x-2}}{2x+3}$

$$\begin{aligned} x-2 &\geq 0 \\ x &\geq 2 \\ 2x+3 &\neq 0 \\ 2x &\neq -3 \\ x &\neq -\frac{3}{2} \\ \boxed{x \geq 2} \end{aligned}$$

- ⑬ For each function, tell the maximum number of turns the function can have,
what is the end behaviors?

a) $f(x) = -x^4 + x^3 + 2x^2$

$X \rightarrow \infty \quad Y \rightarrow -\infty$ (down)

$X \rightarrow -\infty \quad Y \rightarrow -\infty$

b) $f(x) = x^3 + x^2 - x - 2$

$X \rightarrow \infty \quad Y \rightarrow \infty$

$X \rightarrow -\infty \quad Y \rightarrow -\infty$

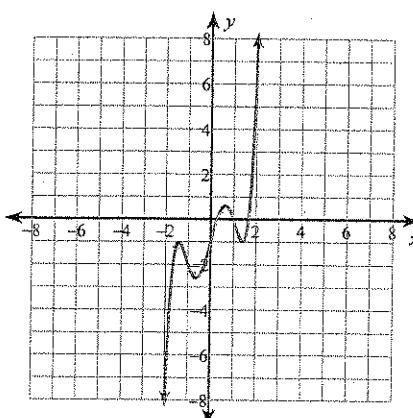
c) $f(x) = -x^5 + 4x^3 - 5x - 2$

$X \rightarrow \infty \quad Y \rightarrow -\infty$

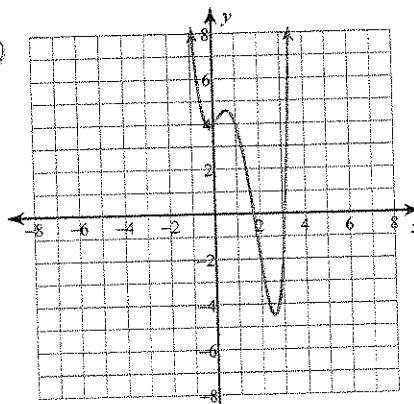
$X \rightarrow -\infty \quad Y \rightarrow \infty$

- ⑭ For the graph given, fill in the blanks.

a)



b)



Degree: Even or Odd (circle one)

minimum degree: 5

Leading coeff.: + or - (circle one)

Degree: Even or Odd

minimum degree: 4

Leading coeff.: + or -

(15) Identify the horizontal and vertical asymptotes.

$$a) f(x) = \frac{2}{3x-6}$$

$$\text{H.A.: } y=0$$

$$\text{V.A.: } x=2$$

$$b) f(x) = \frac{4x-2}{3x+1}$$

$$\text{H.A.: } y = \frac{4}{3}$$

$$\text{V.A.: } x = -\frac{1}{3}$$

$$c) f(x) = \frac{x+2}{x^2+8x-33} \quad (x+1)(x-3)$$

$$\text{H.A.: } y=0$$

$$\text{V.A.: } x=-1 \quad x=3$$

Solve each equation.

$$33. 2^{x+2} = \frac{1}{8} \quad \boxed{x = -5}$$

$$34. \left(\frac{9}{16}\right)^x = \frac{3}{4} \quad \boxed{x = \frac{1}{2}}$$

$$35. 9^{2y+3} = 27^y \quad \boxed{y = -6}$$

$$36. \frac{1}{2} = \left(\frac{b}{4}\right)^{1/4} \quad \boxed{b = 4}$$

Write each equation using logarithms.

$$37. 3^5 = 243 \quad \boxed{\log 243 = 5}$$

$$38. 5^{t/2} = \sqrt{5} \quad \boxed{\log \sqrt{5} = \frac{t}{2}}$$

$$39. \ln 0.8 = -2.22554 \quad \boxed{\ln 2.22554 = .8}$$

$$40. 10^{1.07918} = 12 \quad \boxed{\log 12 = 1.07918}$$

Write each equation using exponents.

$$41. \log_2 32 = 5 \quad \boxed{2^5 = 32}$$

$$42. \log_9 3 = \frac{1}{2} \quad \boxed{9^{\frac{1}{2}} = 3}$$

$$43. \ln 82.9 = 4.41763 \quad \boxed{e^{4.41763} = 82.9}$$

$$44. \log 3.21 = 0.50651 \quad \boxed{10^{0.50651} = 3.21}$$

Evaluate each expression without using a calculator. Then support your work using a calculator and the change-of-base theorem for logarithms.

$$45. \log_3 81 = \boxed{4}$$

$$46. \log_{32} 16 = \boxed{\frac{4}{5}}$$

$$47. \log_4 8 = \boxed{\frac{3}{2}}$$

$$48. \log_{100} 1000 = \boxed{\frac{3}{2}}$$

Simplify each expression using the properties of logarithms.

$$49. \log_5 3k + \log_5 7k \quad \boxed{\log_5(21k)}$$

$$50. \log_3 2y^3 - \log_3 8y \quad \boxed{\log_3 \left(\frac{2y^3}{8y}\right)}$$

$$51. 4 \log_3 y - 2 \log_3 \left(\frac{y^4}{z^2}\right) \quad \boxed{\log_3 \left(\frac{y^4}{z^2}\right)}$$

$$52. 3 \log_4 r^2 - 2 \log_4 r \quad \boxed{\log_4 r^4}$$

Solve each equation if necessary.

round each answer to the nearest thousandth.

$$53. 6^p = 17 \quad \boxed{\log 17 \approx 1.581}$$

$$54. 3^{z-2} = 1 \quad \boxed{4.183}$$

$$55. 2^{1-m} = 7 \quad \boxed{-1.807}$$

$$56. 12^{-k} = 9 \quad \boxed{-0.884}$$

$$57. e^{-5-2x} = 5 \quad \boxed{-3.305}$$

$$58. e^{3x-1} = 14 \quad \boxed{1.213}$$

$$59. \left(1 + \frac{m}{3}\right)^5 = 2.156 \quad \boxed{2.156}$$

$$60. \left(1 + \frac{2p}{5}\right)^2 = 3 \quad \boxed{1.830}$$

$$61. \log_k 64 = 6 \quad \boxed{2}$$

$$62. \log_5 (2x+5) = 5 \quad \boxed{119}$$

$$63. \log(4p+1) + \log p = \log 3$$

$$\log(4p^2+p) = \log 3$$

$$4p^2+p = 3$$

$$4p^2+p-3=0$$

$$p = \frac{3}{4}$$

(65) For each quadratic, find the vertex, x-intercepts and y-intercepts.

$$a) y = 2x^2 + 3x - 1$$

$$b) y = -x^2 + 4x + 2$$

$$\text{vertex: } \left(\frac{-3}{4}, -2.125\right)$$

$$\text{vertex: } (2, 6)$$

$$x\text{-intercepts: } \frac{-3 \pm \sqrt{17}}{4}$$

$$x\text{-intercepts: } \frac{4 \pm \sqrt{24}}{2}$$

$$y\text{-intercept: } -1$$

$$y\text{-intercept: } 2$$

Interest Find the amount of interest earned by each deposit.

70. \$6902 at 6% compounded semiannually for 8 years

\$4173.68

71. \$2781.36 at 4.8% compounded quarterly for 6 years

\$921.95

72. How long will it take for \$1000 deposited at 6% compounded semiannually to double? To triple?

12 years 19 years

73. How long will it take for \$2100 deposited at 4% compounded quarterly to double? To triple?

17.5 years 27.75 years

Interest Find the compound amount if \$12,104 is invested at 6.2% compounded continuously for each period.

74. 2 years

\$13701.92

75. 4 years

\$15510.79

98. *Intensity of Light* The intensity of light (in appropriate units) passing through water decreases exponentially with the depth it penetrates beneath the surface according to the function

$$I(x) = 10e^{-0.3x},$$

where x is the depth in meters. A certain water plant requires light of an intensity of 1 unit. What is the greatest depth of water in which it will grow?

7.7 m

91. *Fever* A certain viral infection causes a fever that typically lasts 6 days. A model of the fever (in °F) on day x , $1 \leq x \leq 6$, is

$$F(x) = -\frac{2}{3}x^2 + \frac{14}{3}x + 96.$$

According to the model, on what day should the maximum fever occur? What is the maximum fever?

Third day

104.2°

