Quiz 7 will cover the following topics: all topics from Quiz 1-6, Exam 1, and graphing of factored polynomials, inverse functions, logarithms (2), and differentiation.

Review Problems

1. Differentiate each of the functions given.

   a) $f(x) = 100x^5 + 5x^{100} + e^{500}$ b) $f(x) = x^6 - \dfrac{1}{x^6}$ c) $f(x) = \sqrt{x^3} - \sqrt[3]{x^2}$

2. Find the inverse for each of the following functions.

   a) $f(x) = 2x - 7$ b) $f(x) = \sqrt{3x+1}$ c) $f(x) = \dfrac{2x-3}{5x+1}$

3. Graph each of the following functions.

   a) $f(x) = x^3(16 - x^2)(x^2 - 9)^2$

   b) $f(x) = (x+6)(5-x)^2(2-x)(x+1)^2(x+3)(x+5)(x-7)$

4. Simplify each of the following expressions.

   a) $\log_6 4 + \log_6 54$ b) $\log_8 \sqrt{32}$ c) $9^{\log_3 5}$

5. Suppose that $x = \log_2 3$. Express each of the following in terms of x.

   a) $\log_2 6$ b) $\log_2 24$ c) $\log_2 36$

6. Consider the functions. $f(x) = \log_2(x+5) + \log_2(x-5)$ and $g(x) = \log_2(x^2 - 25)$.

   a) Find the domain of $f(x) = \log_2(x+5) + \log_2(x-5)$.

   b) Find the domain of $g(x) = \log_2(x^2 - 25)$

   c) Compare the functions $f(x) = \log_2(x+5) + \log_2(x-5)$ and $g(x) = \log_2(x^2 - 25)$. Are these functions equal?

7. Find the domain of each of the following expressions.

   a) $\dfrac{1}{\log_2(x^2 - 6x + 8)}$ b) $\dfrac{1}{\log_2(x-2) + \log_2(x-4)}$

8. Solve each of the following equations.

   a) $\log_2(x-3)(x+1) = 5$

   b) $\log_2(x-3) + \log_2(x+1) = 5$

   c) $\log_2(x+29) - \log_2(x-3) = 1$

   d) $\log_6 x + \log_6(2x+1) = 2$

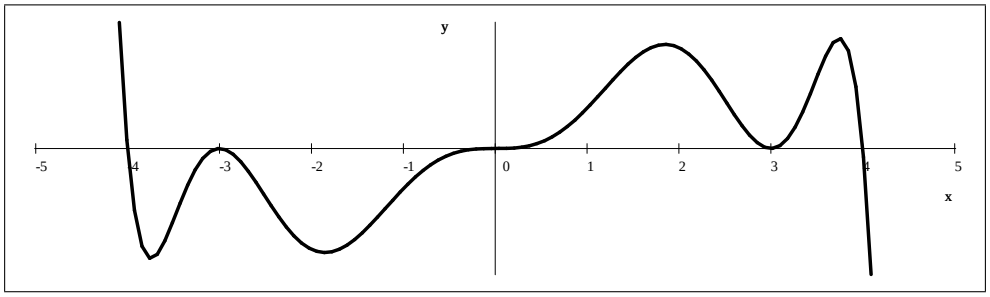
   e) $\log_2(x-5) + \log_2(x+11) = 9$

Review Problems - Answers

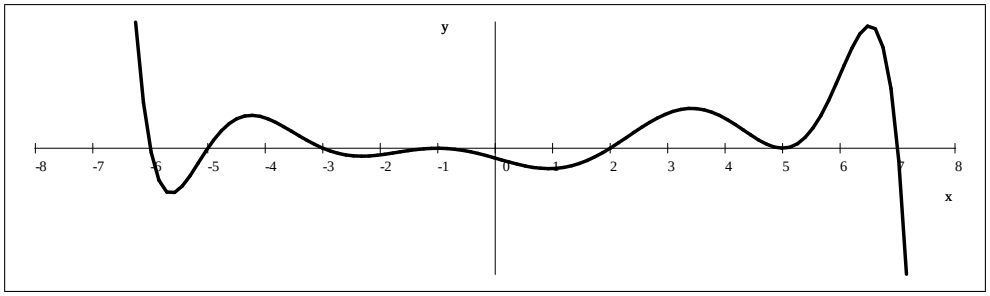
1. a) $f'(x) = 500x^4 + 500x^{99}$ b) $f'(x) = 6x^5 + \dfrac{6}{x^7}$ c) $f'(x) = \dfrac{3}{2}x^{1/2} - \dfrac{2}{3}x^{-1/3} = \dfrac{3}{2}\sqrt{x} - \dfrac{2}{3\sqrt[3]{x}}$

2. a) $f^{-1}(x) = \dfrac{1}{2}x + \dfrac{7}{2}$ b) $f^{-1}(x) = \dfrac{1}{2}x^2 + \dfrac{1}{3}$ c) $f^{-1}(x) = -\dfrac{x+3}{5x-2}$

3. a) $f(x) = x^3(16 - x^2)(x^2 - 9)^2 = -(x+4)(x+3)^2 x^3 (x-3)^2 (x-4)$



b) $f(x) = (x+6)(5-x)^2(2-x)(x+1)^2(x+3)(x+5)(x-7)$



4. a) 3 b) $\dfrac{5}{6}$ c) 25

5. a) $x+1$ b) $x+3$ c) $2x+2$

6. a) $(5, \infty)$ b) $(-\infty, -5) \cup (5, \infty)$ c) no, they have different domains

7. a) $x < 2$ but $x \neq 3 - \sqrt{2}$ or $x > 4$ but $x \neq 3 + \sqrt{2}$
   b) $x > 4$ but $x \neq 3 + \sqrt{2}$

8. a) $-5, 7$ b) 7 c) 35 d) 4 e) 21