# Review Problems

Please note that Quiz 9 will also cover topics cevered on Quizzes 1-8 and Exams 1-2. Please review those topics as well, even if they do not appear on this document.

1. Compute the exact value of each of the following expressions.

   $A = \left(4\sqrt{18} - 5\sqrt{50} + 3\sqrt{98}\right)\left(2\sqrt{2}\right)$ $\qquad$ $C = 2\log_{10} 2 + \log_{10} 18 + 6\log_{10}\sqrt{5} - 2\log_{10} 3$

   $B = 6^{-2} \cdot 16^{-1/2} \cdot 36^{2} \cdot 4^{-3/2}$ $\qquad$ $D = \dfrac{\sqrt{5}}{\left(\sqrt{5}-2\right)^2}$

2. Solve each of the following inequalities.

   a) $\dfrac{3x+8}{2x-1} \le 2$ $\qquad$ b) $3 - \dfrac{x}{x-4} < 1$ $\qquad$ c) $\dfrac{2}{3x+1} \ge \dfrac{3}{5}$

3. Find the domain for each of the following functions.

   a) $f(x) = \sqrt{25x - x^3}$ $\qquad$ b) $f(x) = \sqrt{\dfrac{x}{25-x^2}}$

4. Compute each of the following limits. Show computation.

   a) $\lim\limits_{x\to-\infty}\left(-2x^5 + 8x^2\right)$

   b) $\lim\limits_{x\to\infty}\left(-2x^5 + 8x^2\right)$

   c) $\lim\limits_{x\to-\infty}\left(-2x^5 + 8x^6\right)$

   d) $\lim\limits_{x\to\infty}\left(-2x^5 + 8x^6\right)$

   e) $\lim\limits_{x\to-\infty}\dfrac{3x^2-1}{5x^2-3x+2}$

   f) $\lim\limits_{x\to-\infty}\dfrac{100x-1}{5x^2-3x+2}$

   g) $\lim\limits_{x\to-\infty}\log_2 x$

   h) $\lim\limits_{x\to\infty}\dfrac{2x^2+3x+1}{3x^2-5x+2}$

   i) $\lim\limits_{x\to\infty}\dfrac{-x^3+2x+1}{x-3}$

   j) $\lim\limits_{x\to-\infty} 2^x$

   k) $\lim\limits_{x\to\infty}\log_5 x$

   l) $\lim\limits_{x\to\infty}\left(\dfrac{3}{5}\right)^x$

   m) $\lim\limits_{x\to\infty}\dfrac{2^{x+5}}{4^{x-1}}$

   n) $\lim\limits_{x\to\infty}\dfrac{3^{x+1}\cdot\left(\dfrac{1}{3}\right)^{-x+2}}{9^{x-1}}$

   o) $\lim\limits_{x\to\infty}\dfrac{5^{x+3}}{3^{2x-1}}$

   p) $\lim\limits_{x\to\infty}\dfrac{x^3-4x^2+1}{3x^2-3x^3+7}$

   q) $\lim\limits_{x\to-\infty}\dfrac{x^4+11x^2+1}{3x^7-x^4+7}$

5. Solve the following system of equations. $\begin{cases} 2^x = 8^{y+1} \\ 9^y = 3^{x-9} \end{cases}$

6. Find an equation for all tangent lines drawn to the parabola from the point given.

   a) to $y = -\dfrac{1}{2}x^2 + 3x - 4$ from the point $(-1,-7)$ $\qquad$ b) to $y = x^2 - 2x + 7$ from the point $(1,2)$

7. Sketch the graph of each of the following functions.

   a) $f(x) = (x+2)(x-1)(x-4)$ $\qquad$ b) $f(x) = -x^3 + 4x$ $\qquad$ c) $f(x) = -\dfrac{1}{2}x(x-3)^2$

8. Sketch the graph of each of the following functions.

   a) $f(x) = -2(x+3)x(x-2)(x-4)$ $\qquad$ b) $f(x) = x^4 - 4x^2$ $\qquad$ c) $f(x) = -x^2(x-3)^2$

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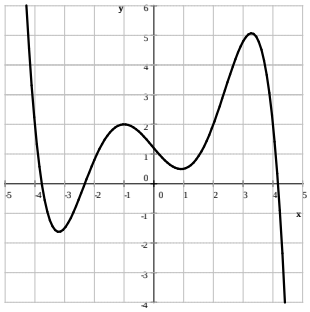
9. The picture below shows the graph of a function $f(x)$. Graph each of the following functions.



a) $g(x) = |f(x)|$ b) $p(x) = \dfrac{f(x) + |f(x)|}{2}$ c) $q(x) = f(x) \cdot \dfrac{x-2}{x-2}$ d) $h(x) = \dfrac{1}{f(x)}$

10. Sketch the graph of each of the following functions.

a) $f(x) = x - 2$ d) $f(x) = \dfrac{1}{x-2}$ g) $f(x) = \dfrac{(x-2)^5}{(x-2)^7}$ j) $f(x) = \dfrac{(x-2)^5}{(x-2)^4}$

b) $f(x) = (x-2)^2$ e) $f(x) = \dfrac{1}{(x-2)^2}$ h) $f(x) = \dfrac{(x-2)^2}{(x-2)^5}$ k) $f(x) = \dfrac{(x-2)^7}{(x-2)^5}$

c) $f(x) = (x-2)^3$ f) $f(x) = \dfrac{1}{(x-2)^3}$ i) $f(x) = \dfrac{(x-2)^6}{(x-2)^6}$ l) $f(x) = \dfrac{(x-2)^5}{(x-2)^2}$

## Review Problems - Answers

1. $A = 32$ $B = \dfrac{9}{8}$ $C = 3$ $D = 9\sqrt{5} + 20$
2. a) $\left(-\infty, \dfrac{1}{2}\right) \cup [10, \infty)$ b) $(4, 8)$ c) $\left(-\dfrac{1}{3}, \dfrac{7}{9}\right]$
3. a) $(-\infty, -5] \cup [0, 5]$ b) $(-\infty, -5) \cup [0, 5)$
4. a) $\infty$ b) $-\infty$ c) $\infty$ d) $\infty$ e) $\dfrac{3}{5}$ f) $0$ g) undefined h) $\dfrac{2}{3}$ i) $-\infty$ j) $0$
   k) $\infty$ l) $0$ m) $0$ n) $3$ o) $0$ p) $-\dfrac{1}{3}$ q) $0$
5. $x = 21, y = 6$
6. a) $y = 5x - 2$ and $y = 3x - 4$ b) $y = 4x - 2$ and $y = -4x + 6$

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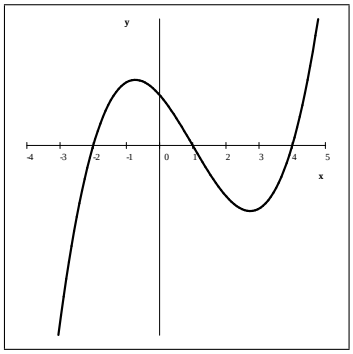
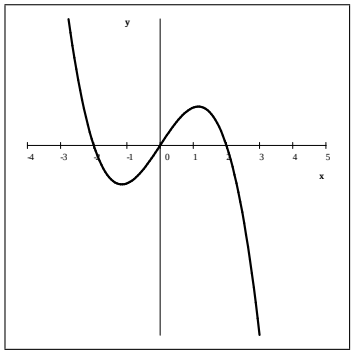
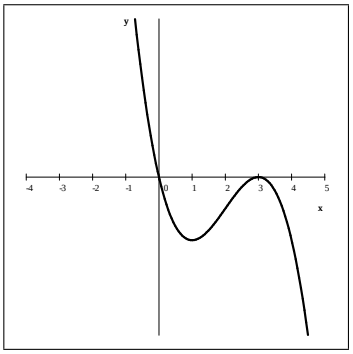
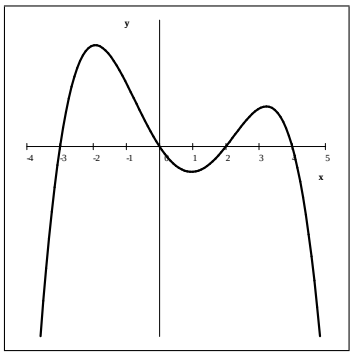
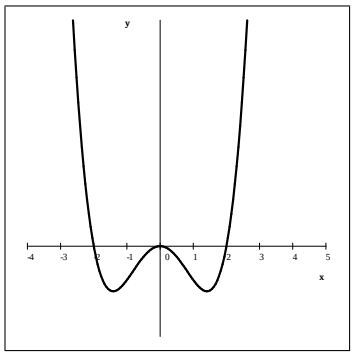
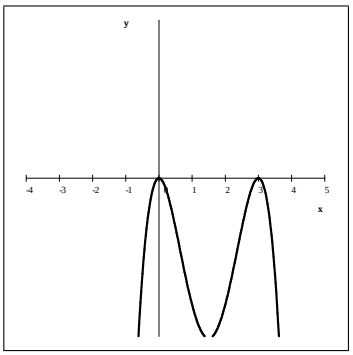
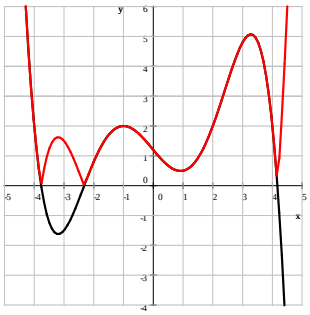
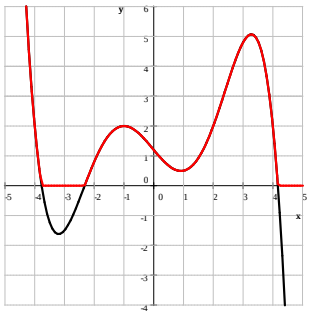
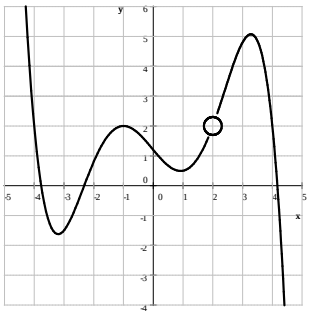
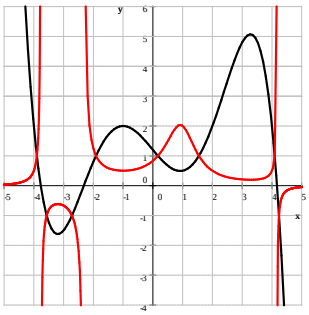
7. a) $f(x) = (x+2)(x-1)(x-4)$ b) $f(x) = -x^3 + 4x$ c) $f(x) = -\frac{1}{2}x(x-3)^2$

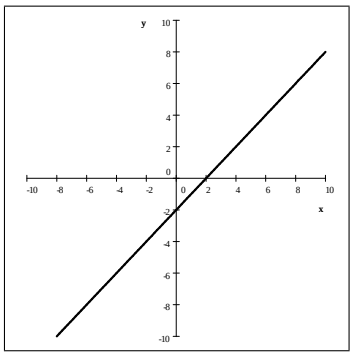
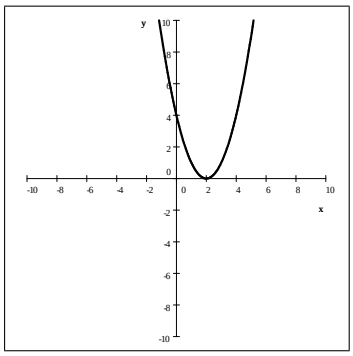
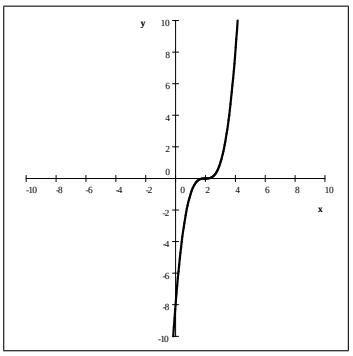
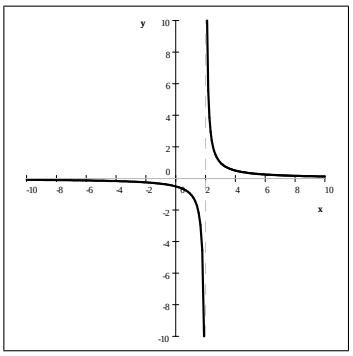
8. a) $f(x) = -2(x+3)x(x-2)(x-4)$ b) $f(x) = x^4 - 4x^2$ c) $f(x) = -x^2(x-3)^2$

9. a) $g(x) = |f(x)|$ b) $p(x) = \frac{f(x) + |f(x)|}{2}$ c) $q(x) = f(x) \cdot \frac{x-2}{x-2}$ d) $h(x) = \frac{1}{f(x)}$

10. a) $f(x) = x - 2$ b) $f(x) = (x-2)^2$ c) $f(x) = (x-2)^3$ d) $f(x) = \frac{1}{x-2}$

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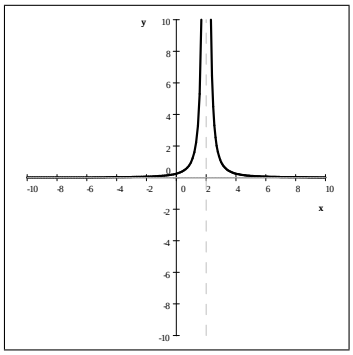
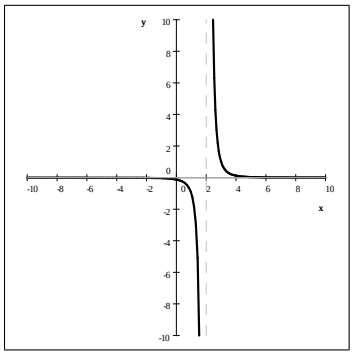
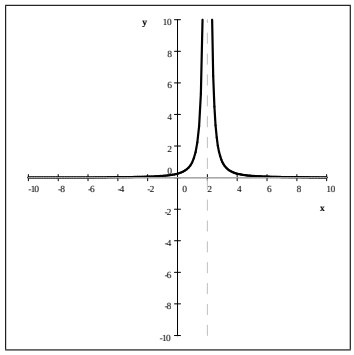
e) $f(x) = \dfrac{1}{(x-2)^2}$



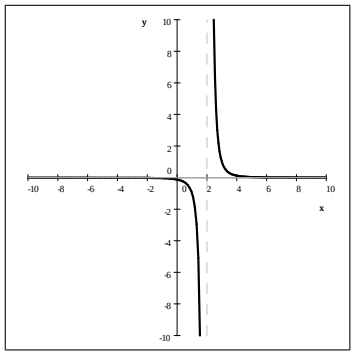
f) $f(x) = \dfrac{1}{(x-2)^3}$



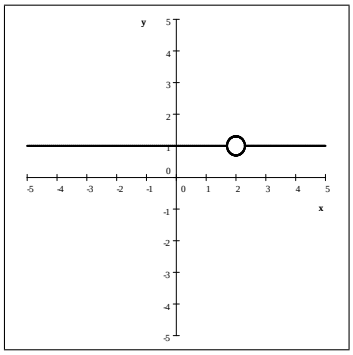
g) $f(x) = \dfrac{(x-2)^5}{(x-2)^7}$



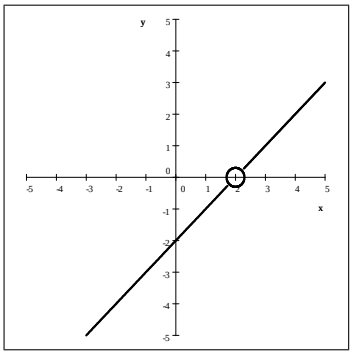
h) $f(x) = \dfrac{(x-2)^2}{(x-2)^5}$



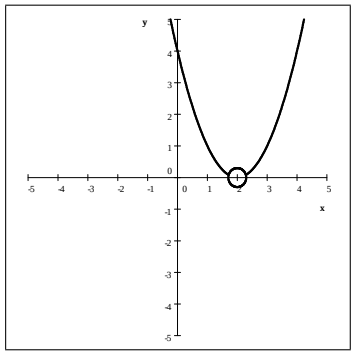
i) $f(x) = \dfrac{(x-2)^6}{(x-2)^6}$



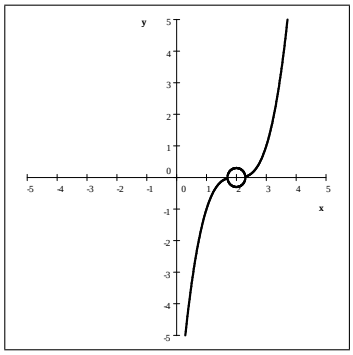
j) $f(x) = \dfrac{(x-2)^5}{(x-2)^4}$



k) $f(x) = \dfrac{(x-2)^7}{(x-2)^5}$



l) $f(x) = \dfrac{(x-2)^5}{(x-2)^2}$



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