Math 105 Quiz 2
9/21/12
§1.6,§1.7, §2.1
Show all work for credit. Give brief but concise explanations.

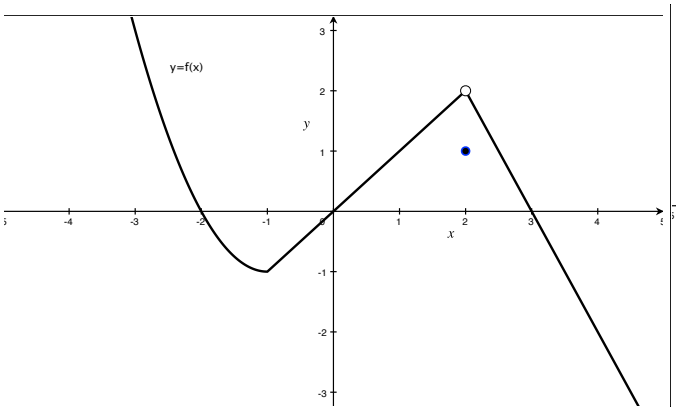
1. $f(x) = 2x^3 - 3x^2 - 12x$, $f'(x) = 6x^2 - 6x - 12$, and $f''(x) = 12x - 6$.

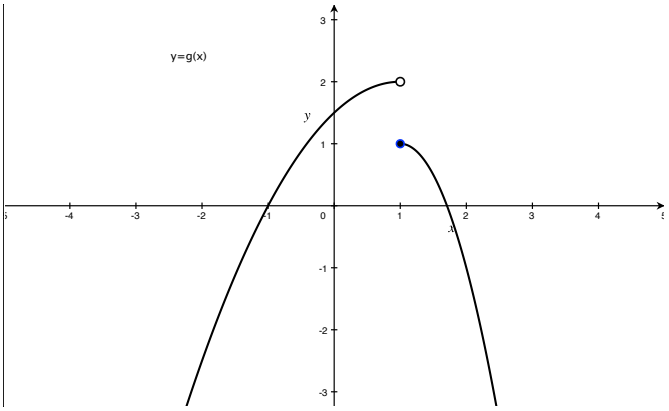
   (a) Find the intervals when $f'(x)$ is increasing and decreasing.
   Increasing: $(\frac{1}{2}, \infty)$, Decreasing: $(-\infty, \frac{1}{2})$

   (b) Where are the stationary points of $f(x)$? Classify each as a maximum, minimum, or neither. Give your reason.
   The stationary points of $f(x)$ are the x-values where there are horizontal tangents lines on $f(x)$.
   $f'(x) = 0 \to 6x^2 - 6x - 12 = 0 \to 6(x^2 - x - 2) = 0 \to 6(x-2)(x+1) = 0$, so $x = 2$ and $x = -1$.
   $f''(2) > 0$. $f(x)$ is concave up at $x = 2$ and $f'(x) = 0$, so $x = 2$ is a min.
   $f''(-1) < 0$. $f(x)$ is concave down at $x = -1$ and $f'(x) = 0$, so $x = -1$ is a max.

   (c) Does $f(x)$ have an inflection point? If so, where? How do you know it is an inflection point?
   When $f''(x) = 0$, there may be an inflection point. So at $x = \frac{1}{2}$. Since $f''(0) < 0$ and $f''(1) > 0$ we see that $f(x)$ changes concavity.

2. The graphs of f and g are given. Use them to evaluate the limit, if it exists. If the limit does not exist, explain why.





   (a) $\lim_{x \to 2} f(x) = 2$

   (b) $\lim_{x \to 1^-} [f(x) + g(x)] = 1 + 2 = 3$

   (c) $\lim_{x \to 0} f(x)g(x) = 0 \cdot 1.5 = 0$