Math 163A **Guide for Test 2**

Here are some sample questions from old tests. Some topics that we covered are not represented by these questions, but are still fair game.

1. Compute the following limits:

   (a) $\lim_{x\to 2} \dfrac{x-2}{x^2-5x+6}$

   (b) $\lim_{h\to 0} \dfrac{x^2-(x-2h)^2}{h}$

   (c) $\lim_{x\to 1} \dfrac{\sqrt{x}-1}{x-1}$

   (d) $\lim_{x\to -\infty} \dfrac{3x^3-4}{2x^3-2}$

2. Let $f(x) = -x^2+3$.

   (a) Using the definition of the derivative as a limit, compute $f'(x)$.

   (b) Find the equation for the tangent line at $x = 2$.

   (c) Graph $f(x)$ and the tangent line.

3. Compute the following derivatives:

   (a) $f(x) = 2 + x + \dfrac{3}{x} - \sqrt{x} - 5x^7 + x^{3/4}$
   $\Rightarrow f'(x) =$

   (b) $y = \dfrac{x^3+x}{x} \Rightarrow \dfrac{dy}{dx} =$

   (c) $D_x\left[(x^9+x^8+x^5+3)(1+2x^2+9x^3-4x^4)\right] =$

   (d) $\dfrac{d}{dx}\left[(x^9+2x^{1/3}+x^5+3)^4\right] =$

4. Compute the following derivatives:

   (a) If $f(x) = \dfrac{u(x)v(x)}{w(x)}$, then in terms of $u(x)$, $v(x)$, $w(x)$, $u'(x)$, $v'(x)$, and $w'(x)$, we have $f'(x) =$

   (b) $y = (3+x^4)^8x^3 \Rightarrow \dfrac{dy}{dx} =$

   (c) $D_x\left[\left((x^9+x^8+x^5+3)(1+2x^2+x^3-4x^4)\right)^9\right] =$