# Math 2
## Homework 1
### Due: January 11, 2010

**1.** Calculate
$$\lim_{x \to 1} \frac{\sin(x)}{x - 1}$$
or show that the limit does not exist.

**2.** Using the limit definition of the derivative, calculate $f'(x)$, where
$$f(x) = 3x^2 + 2x + 1 + e^x.$$
You may use the fact that $\lim_{h \to 0} \dfrac{e^h - 1}{h} = 1$.

**3.** Find $f'(x)$, where $f(x) = \sin(e^{x^2})$.

**4.** Let $f(x) = 3x^2 + 2x + 1$, $g(x) = \sin(x)e^x$ and $h(x) = f(g(x))$. Find $h'(x)$.

**5.** Sketch the graph of $f(x) = \cos^2(x)$ on the interval $[-\pi, 2\pi]$.

**6.** Sketch the graph of $f(x) = 3 + \ln(2x)$ on the interval $(0, 5]$. Label any absolute maxima/minima.

**7.** Sketch the graph of $f(x) = e^{-x}$ on the interval $(-\infty, \infty)$. Label any absolute maxima/minima.

**8.** Sketch the graph of
$$y = \frac{x}{\sqrt{1 - x^2}}.$$