Practice Exam 3 Math 160

1. Let $f(x) = x^2 - 3x$ and $g(x) = 3x - 7$
   (a) Find $f \circ g(0)$.
   (b) Find $f \circ g(1)$.
   (c) Find $f \circ g(a)$.
   (d) Find $g \circ f(2)$.
   (e) Find $g \circ f(b)$.

2. Find the following limits (if they don't exist write DNE):
   (a) Find $\lim_{x \to 2} \dfrac{1}{x+2}$.
   (b) Find $\lim_{x \to 2} \dfrac{1}{x-2}$.
   (c) Find $\lim_{x \to 2} \dfrac{x^2-4}{x-2}$.
   (d) Find $\lim_{x \to \infty} \dfrac{1}{x-2}$.
   (e) Find $\lim_{x \to \infty} \dfrac{3x^3 - 7x^2 + 18000}{2x^3 - 2}$.

3. Find the derivatives of the following functions:
   (a) $x + 2$.
   (b) $x^3 + x - 2$.
   (c) $\dfrac{x^2-4}{x-2}$.
   (d) $\dfrac{1}{x-2}$.
   (e) $\left(x^2 + 5x\right)^{10}$.
   (f) e^{3x^2}.

4. Let $f(x) = 3x^2 - 7x + 2$.
   (a) Find the minimum of $f(x)$.
   (b) Find $f^{'}(x)$.
   (c) Find $f^{'}(3)$.
   (d) Find the equation of the line tangent to $f(x)$ when $x = 3$.

5. Suppose customers in a hardware store are willing to buy $N(p)$ boxes of nails at p dollars per box, as given by
$$N(p) = 80 - 5p^2 \qquad (1 \leq p \leq 4).$$
   (a) Find the average rate of change of demand for a change in price from \$2 to \$3.
   (b) Find the instantaneous rate of change of demand when the price is \$2.
   (c) Find the instantaneous rate of change of demand when the price is \$3.
   (d) As the price is increased from \$2 to \$3, how is demand changing? Is the change to be expected?