Name: _____

Directions: Show all work. No credit for answers without work.

1. [**6 points**] Find the derivatives of the following functions.

(a) $y = 4x + 7$

(b) $y = x^8$

(c) $y = 2x^{2.5}$

(d) $y = 2x^9 - 4x^3$

(e) $y = \sqrt{x}$

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

(g) $\sqrt{5}x^{\ln 3}$

(h) $y = e^{6x}$

(i) $y = 7^x$

(j) $y = (\ln 9)^x$

(k) $y = 3 \ln x$

(l) $y = e^{-x} - \ln(x^2) + 1$

2. [**2 points**] Let $C(q)$ be the total cost (in dollars) of producing q items. Suppose that $C(820) = 2180$ and $C'(820) = 21$.

   (a) Estimate the cost of producing 823 items.

   (b) Estimate the cost of producing 818 items.

3. [**2 points**] Find the equation of the line tangent to the graph of $f(x) = 5x + x^2$ at $x = 1$.