Nice Derivatives

1. Use the properties discussed in class to find the following:

$$\frac{d}{dx}(x^7 - x^\pi + x^2 - 6.1)$$

$$\left(\frac{3}{4}x^8\right)'$$

$$\left(\left(\frac{1}{2}x\right)^5\right)'$$

$$\frac{d}{dx}\left(\frac{x^2 - 2\sqrt{x}}{x}\right)$$

2. For what values of x does the graph of $f(x) = x^4 - 6x^2 + 4$ have a horizontal tangent?

3. Consider $\alpha(x) = x^4 + 2e^x$.

    (a) Find the equation of the line tangent to the graph of α at the point $(0, 2)$.

    (b) Find the line normal the the line you found in part (a) that also passes through the point $(0, 2)$.

4. At what point on the curve of $y = 1 + 2e^x - 3x$ is the tangent line parallel to the line $3x - y = 5$?

5. Find equations of both lines that are tangent to the curve $y = 1 + x^3$ and are parallel to the line $12x - y = 1$.