Worksheet # 23: Antiderivatives

1. Find the most general antiderivative for each of the following functions.

   (a) $x - 3$

   (b) $\frac{1}{4}x^6 - 5x^3 + 9x$

   (c) $(x+1)(9x-8)$

   (d) $\sqrt{x} - \frac{2}{\sqrt{x}}$

   (e) $\frac{5}{x}$

   (f) $\sqrt{x^5} - 40$

   (g) $\frac{x^3 - 8x^2 + 5}{x^2}$

   (h) $\frac{5}{x^6}$

   (i) $\frac{\sqrt{x}}{x^2} + \frac{3}{4}x^3$

   (j) $\frac{2}{5}x^e$

   (k) $\frac{1}{x-3}$

   (l) $\sin(\theta) - \sec^2(\theta)$

2. Find the values of the parameter A and B so that

   (a) $F(x) = (Ax + B)e^x$ is an antiderivative of $f(x) = xe^x$.

   (b) $H(x) = e^{2x}(A\cos x + B\sin x)$ is an antiderivative of $h(x) = e^{2x}\sin x$.

3. A particle moves along a straight line so that its velocity is given by $v(t) = t^2$. What is the net change in the particle's position between $t = 1$ and $t = 3$?

4. Suppose an object travels in a straight line with constant acceleration a, initial velocity v_0, and initial displacement x_0. Find a formula for the position function of the object.

5. A car brakes with constant deceleration of 5 m/s^2 produceing skid marks measuring 75 meters long before coming to a stop. How fast was the car traveling when the brakes were first applied?

6. True or false?

   (a) The antiderivative of function is unique.

   (b) If F is the antiderivative of f then f is differentiable.

   (c) If F is the antiderivative of f then $F + c$ where c is a constant is also an antiderivative.