Homework 2.1 – Derivatives of Quadratic Functions

1. (1 pt) **alfredLibrary/AUCI/chapter2/lesson1/quiz-/questionQuadp4.pg**

The point $P = (5,36)$ lies on the curve $y = x^2 + x + 6$.

(a) For the given values of x, let Q be the nearby point $(x, x^2 + x + 6)$. Find the slope of the secant line between P and Q. (Hint: $\frac{y(x)-y(5)}{x-5}$.)

If $x = 5.1$, then the slope between P and Q is _____

If $x = 5.01$, then the slope between P and Q is _____

If $x = 4.9$, then the slope between P and Q is _____

If $x = 4.99$, then the slope between P and Q is _____

(b) Based on the above results, guess the slope of the tangent line (derivative) at $P = (5,36)$.

$y'(5) =$ _____

2. (1 pt) **alfredLibrary/AUCI/chapter2/lesson1/Velocity2p.pg**

If a ball is thrown straight up into the air with an initial velocity of 85 ft/s, its height in feet after t seconds is given by $h(t) = 85t - 16t^2$. Find the average velocity on the following time intervals:

[2,2.1]: _____ ft/s

[2,2.01]: _____ ft/s

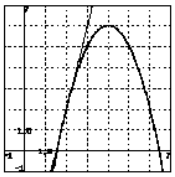
[2,2.001]: _____ ft/s

Based on the above results, guess what the instantaneous velocity of the ball is when $t = 2$.

$v(2) =$ _____ ft/s

3. (1 pt) **alfredLibrary/AUCI/chapter2/lesson1/estimateslope1pet.pg**

Use the graph of $y = f(x)$ in the accompanying figure to estimate the value of $f'(2)$.



Click on the image to see a larger graph.

An estimate of $f'(2)$ is _____

4. (1 pt) **alfredLibrary/AUCI/chapter2/lesson1/growthrate2pet.pg**

The population of a slowly growing bacterial colony after t hours is given by $p(t) = 4t^2 + 34t + 200$ bacteria. The growth rate after 2 hours is _____ bacteria per hour. (Use the formula for the derivative of a quadratic.)

5. (1 pt) **alfredLibrary/AUCI/chapter2/lesson1/quadapplication3pet.pg**

Suppose that the equation of motion for a particle is $s(t) = 4t^2 - 2t + 4$, where s is meters and t is seconds.

(a) Find the velocity and acceleration as functions of t. (Use the formulas for the derivatives of quadratic and linear functions.)

$v(t) =$ _____ m/s

$a(t) =$ _____ m/s^2

(b) Find the time at which the particle is at rest.

$t =$ _____ s