1. A ball is thrown down from the top of a building. The distance (in feet) it has traveled after t seconds is $f(t) = 16t^2 + 20t$.

   (a) Find the average velocity of the ball between $t = 2$ and $t = 5$.

   (b) Find the average velocity of the ball between $t = 2$ and $t = 4$.

   (c) Find the average velocity of the ball between $t = 2$ and $t = 3$.

   (d) Find the average velocity of the ball between $t = 2$ and $t = 2.5$.

   (e) Find the average velocity of the ball between $t = 2$ and $t = 2.1$.

   (f) Find the average velocity of the ball between $t = 2$ and $t = 2.01$.

   (g) From your answers to the above, what do you expect will be the instantaneous velocity of the ball at time $t = 2$ seconds?

   (h) Find an expression for the average velocity of the ball between $t = 2$ and $t = 2 + h$.

   (i) Simplify the expression you found in part 1h, and determine what happens to this simplified expression when h is very close to zero.

2. The graph of f is shown below.
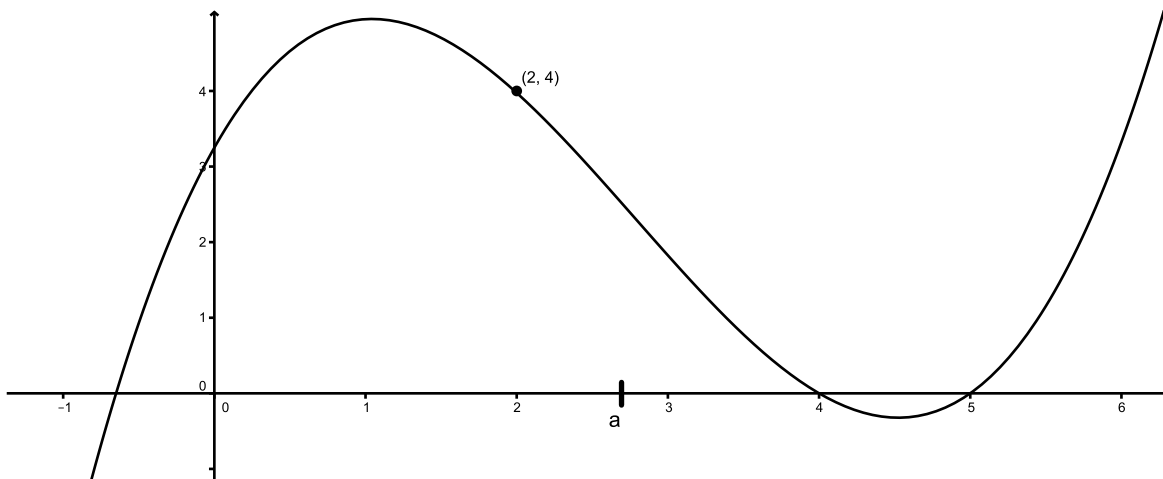
   (a) Find an expression for the slope of the line between $(0, f(0))$ and $(2, f(2))$.

   (b) Find an expression for the slope of the line between $(a, f(a))$ and $(2, f(2))$.

   (c) Find an expression for the slope of the line between $(2, 4)$ and $(b, f(b))$, where b is an arbitrary number.

   (d) Find an expression for the slope of the line between $(2, 4)$ and $(2 + h, f(2 + h))$.

3. Consider the function $f(x) = 3x^2 - 2x + 1$.

(a) Find the slope of the line that passes through $(2, 9)$ and $(2.5, f(2.5))$.

(b) Find the slope of the line that passes through $(2, 9)$ and $(2.1, f(2.1))$.

(c) Find an expression for the slope of the line that passes through $(2, 9)$ and $(2 + h, f(2 + h))$.

(d) Simplify the expression you found in part 3c, and determine what happens to this simplified expression when h is very close to zero.

(e) Looking at your answer to part 3d, what information do you now know about the line that is tangent to the graph of $y = f(x)$ at $x = 2$?

(f) Find the equation of the line that is tangent to the graph of f at $(2, 9)$.