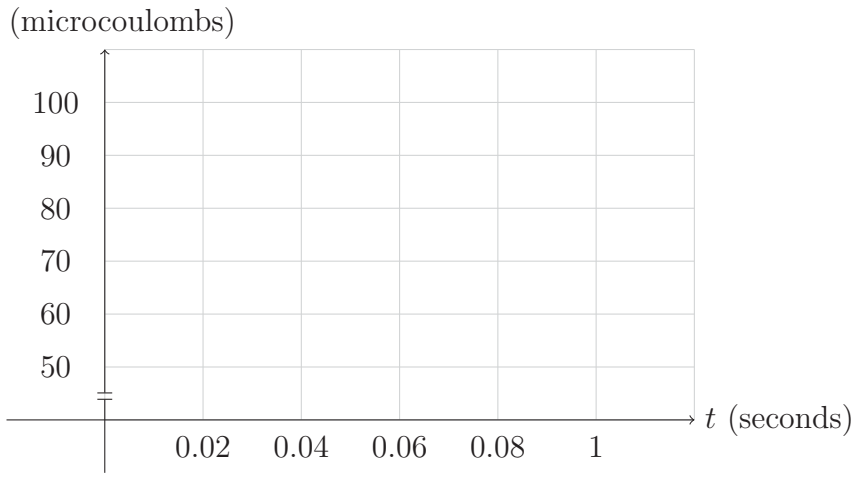
MTH 251 In Class Worksheet 1

1. Use a table to determine the slope of the tangent line to the parabola $y = x^2$ at the point $P = (1, 1)$ and then determine the equation of the tangent line.

2. The flash unit on a camera operates by storing charge on a capacitor and releasing it suddenly when the flash is set off. The data described in the table gives the charge Q remaining on the capacitor (measured in microcoulombs) at time t (measured in seconds after the flash goes off). Use the data to draw the graph of this function and estimate the slope of the tangent line at the point where $t = 0.04$. [*Note*: The slope of the tangent line represents the electric current flowing from the capacitor to the flash bulb (measured in microamperes).]

t	Q
0.00	100.00
0.02	81.87
0.04	67.03
0.06	54.88
0.08	44.93
0.10	36.76



3. Determine and simplify the difference quotient for the following functions:

   a. $f(x) = 12x^2 - 9$

   b. $g(x) = -16x^2 + 64x + 20$

4. Suppose that a ball is dropped from the upper observation deck of the CN Tower in Toronto, 450 m above the ground. The distance that such a ball has fallen is given by the function $s(t) = 4.9t^2$. Find the *velocity* of the ball at 5 seconds after it has been dropped.