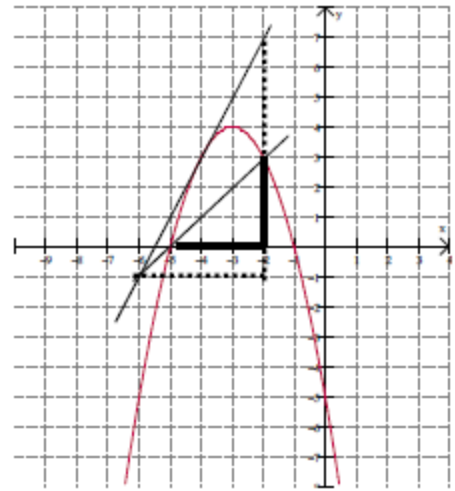1. Find the following rates of change using a graphical method (using the graph at the right).
   a) The average rate of change from x = -5 to x = -2.
   b) The instantaneous rate of change at x = -4.

2. Using the first principles definition of the derivative find
   a) $f'(x)$ if $f(x) = 2x^2 + 7x - 3$
   b) $h'(x)$ if $h(x) = 9^x$
   c) $g'(-1)$ if $g(x) = -\dfrac{5}{2x+3}$

3. A certain bacteria culture starts with a population of 120. The population grew to 5000 in 1 day.
   a) Find a formula for the number of bacteria after t hours.
   b) How many bacteria were there after 14 hours?

4. A transportation company sells 2000 bus tickets per day when the price is $10 per ticket. They believe that for every $1 increase in ticket price they will sell 100 tickets less. Use the calculus to determine what price the company should charge to maximize their revenue.

5. A sample of radioactive Plutonium started with a mass of 16.2 mg. This isotope's half-life is 2.7 hours.
   a) Find a formula for the amount of Plutonium remaining after t hours.
   b) How long (from the original sample) will it take for the sample size to be down to only 1 mg?

6. Sketch the graph of the following functions using local maximum/minimums, intercepts, asymptotes, points of inflection and concavity.

a) $f(x) = x^4 - 8x^3 + 18x^2$

b) $f(x) = \dfrac{10}{(x+2)^2}$