Topics for Chapter 4 Test 1

1) Rates of Change

   a. Position, velocity, and acceleration

   b. The Mean Value Theorem $f'(c) = \dfrac{f(b) - f(a)}{b - a}$

   $m_t = m_s$

   c. The Mean Value Theorem $v(c) = \dfrac{s(b) - s(a)}{b - a}$

   $v_{inst.} = v_{avg}$

2) Behavior of Functions

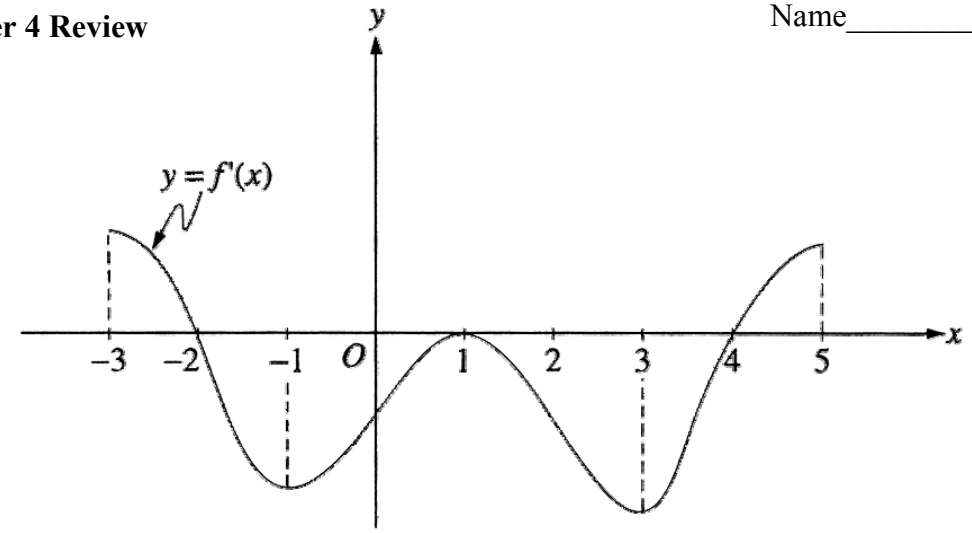
   a. Finding relative and absolute extrema

   b. Finding points of inflection

   c. Using the graph of f' to interpret f

A note sheet is allowed with the same rules applying as on other tests. Calculators are *not* allowed on this test.

Chapter 4 Review Name_____



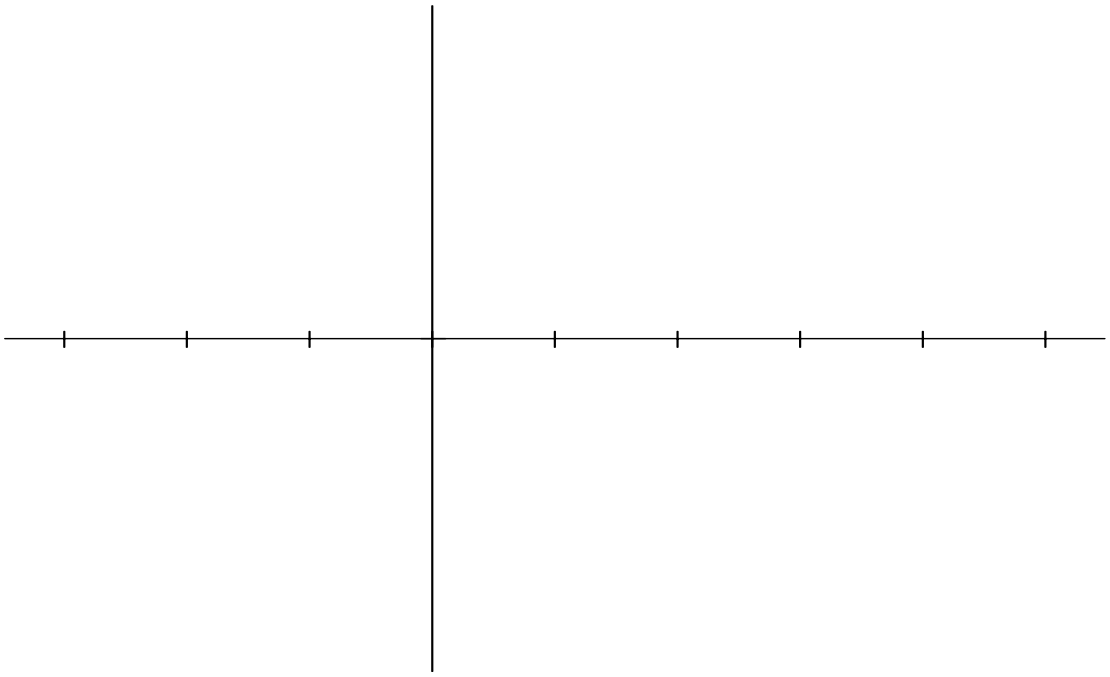
1) The figure above shows the graph of f', the derivative of a function f over the interval $-3 < x < 5$.

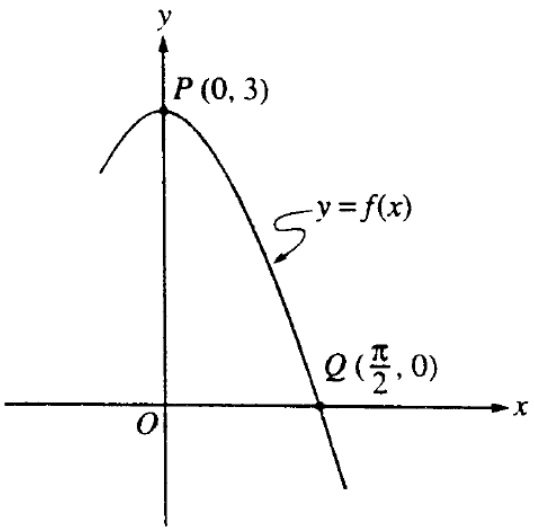
(a) For what values of x does f have a relative maximum? Explain.

(b) For what values of x does f have a relative minimum? Explain

(c) On what intervals is the graph of f concave upward? Use f' to justify your answer.

(d) Suppose that $f(1) = 0$. In the xy-plane provided, draw a sketch that shows the general shape of the graph of the function f on the interval $-3 < x < 5$.





2) Let f be the function given by $f(x) = 3\cos x$. As shown above, the graph of f crosses the y-axis at the point P and the x-axis at point Q.

(a) Write an equation for the line passing through the points P and Q.

(b) Find the x-coordinate of the point on the graph of f, between points P and Q, at which the line tangent to the graph of f is parallel to the line PQ.

(c) Write an equation for the tangent line at the x-coordinate found in part (c).

3) Given the function $y = \frac{x^4}{12} + \frac{x^3}{3}$ for all real numbers,

(a) Find all critical points and identify each as a relative maximum, minimum, or neither.

(b) Identify any absolute extrema and give both their x and y coordinates

(c) On which intervals is y increasing? Decreasing?

(d) Find all points of inflection.

(e) On which intervals is y concave up? Concave down?

4) A particle moves along the x-axis with position $s(t) = t^2 - 4t + 3$ over the interval $0 \le t \le 4$.

(a) When is the particle moving to the left?

(b) When does the particle change directions?

(c) What is the particle's location when it changes directions?

(d) At what time is the particle's average velocity over the interval $0 \le t \le 4$ equal to its instantaneous velocity? What is the value of this velocity?