MTH2205 - Exam 1, Baruch College, Summer 2021

Show all your works for partial and full credits (10pts each, TOTAL: 100pts)

Submission link: https://www.dropbox.com/request/BGOizjwuxFiTUP4hiYld

Please name your submission PDF as `2205Exam1_Lastname_Firstname` (noticing the underscore)
e.g., for John Smith, the filename should read `2205Exam1_Smith_John`.

Violation of the naming rule will incur a 20% penalty to the score.

(1) Find all of the points at which the graph of $f(x) = x^4 - 4x + 5$ has horizontal tangent lines.

(2) If the derivative of $g(x)$ is $g'(x) = (x-1)^2(x-2)$. Determine the intervals in which the function $g(x)$ is concave upwards or concave downward.

(3) Find all relative extrema (if any) for $f(x) = 2x^6 + 3x^4 + 5$.

(4) Find all of the critical numbers of $f(x) = 2\sqrt{9 - x^2}$.

(5) Solve $f''(x) = 0$ for the function $f(x) = 4x^3 - 9x + 1$.

(6) Find the elasticity of demand when the price is 8 for the demand function $xp^2 = 16$.

(7) Find the open interval(s) on which $f(x) = \frac{x}{x^2+9}$ is decreasing and increasing.

(8) A farmer plans to fence a rectangular pasture adjacent to a river, see Figure 1 below. The pasture must contain 245,000 square meters in order to provide enough grass for the herd. What dimension will require the least amount of fencing if no fencing is needed along the river?

(9) The position of an object at any time t is given by $s(t) = -8t^2 + 20t + 10$. Find the time when the velocity is 0.

(10) Determine the linear approximation of $f(x) = 5x^3 - 7x^2 + 11x - 1$ near $x_0 = 2$.

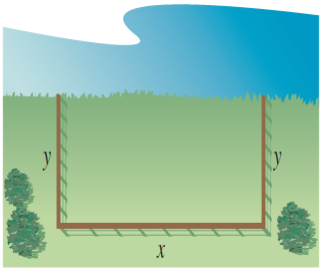

Figure 1.