MATH 1550 Test 3 2020-03-13

NAME:

Exercise 1 Find the absolute extrema (maxima and minima) for the function $f(x) = 2x^3 - 3x^2 - 12x + 5$ on the interval $[0, 4]$, and determine where those values occur.

Exercise 2 For the function $f(x) = 2x^3 + 9x^2 + 12x + 36$

i. Identify the critical points.

ii. Find the intervals on which the function is increasing or decreasing.

iii. Identify all local extrema.

iv. Identify the inflection points.

v. Find the interval on which the function is concave up or concave down.

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Exercise 3 Verify that the hypotheses of the mean-value theorem are satisfied for $f(x) = x^3$ on the interval $[-3, 5]$, and find all values of c that satisfies the conclusion of the theorem.

Exercise 4 A landscape architect wishes to enclose a rectangular garden of area $1000m^2$ on one side by a brick wall costing $80\,\$\,m^{-1}$ and on the other side by a metal fence costing $20\,\$\,m^{-1}$. Which dimensions minimize the total cost?

Exercise 5 Find the limits. Show your work.

i. $\lim_{x\to 0} \frac{e^x-1}{x^2+3x}$

ii. $\lim_{x\to 0^+} (x+\cos(x))^{\frac{1}{x}}$

iii. $\lim_{x\to 0} x\csc(x)$