

MTH 1125 (2 pm) Test #3

FALL 2024

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Name _____

Instructions. Show CLEARLY how you arrive at your answers.

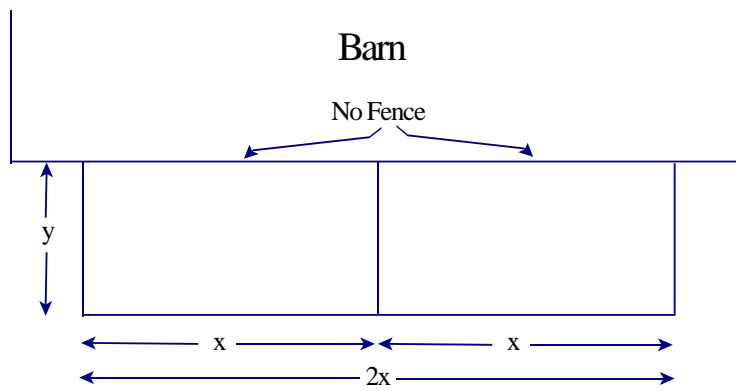
1. $f(x) = x^3 - 3x^2 - 24x + 5$ Determine the intervals on which $f(x)$ is increasing/decreasing and identify all relative maximums and minimums.

2. $f(x) = x^4 - 2x^3 - 36x^2 + 4x + 2$ Determine the intervals on which $f(x)$ is Concave up/Concave down and identify all points of inflection. Determine the intervals on which $f(x)$ is Concave up/Concave down and identify all points of inflection. (Caution - there are **two** points of inflection. Make sure you get them both!)

3. $f(x) = x^3 + 3x^2 - 9x + 2$ on the interval $[-2, 3]$. Find the Absolute Maximum and Absolute Minimum values (if they exist).

4. $f(x) = \frac{1}{3}x^{\frac{12}{5}} - 18x^{\frac{2}{5}} + 1$ Determine the intervals on which $f(x)$ is increasing/decreasing and identify all relative maximums and minimums.

5. Farmer Joe has 180 feet of wire fencing. He will use the fencing to make a rectangular pen. His barn will form one side of the pen, so no wire fencing will be used on that side. In addition, he will use some of the fencing to partition the pen into two smaller pens of similar shape and equal area. (See below) What should the overall dimensions of the pen be, in order for the enclosed area to be as large as possible?



EXTRA! (Wow! 10 points!)

- In the exercise below,
- ¹Determine the intervals on which $f(x)$ is increasing/decreasing
 - ²Identify all relative maximums and minimums
 - ³Determine the intervals on which $f(x)$ is CCU/CCD
 - ⁴Identify all points of inflections
 - ⁵Graph $f(x)$

$$f(x) = x^3 - 6x^2 + 9x + 3$$