Mr. Staszzkow
M101A Sample Test Ch 3
Show your work in the spaces provided to receive credit.

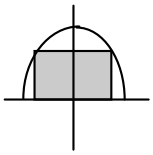
I. Given the function, $f(x) = x^3 - 3x^2 - 45x + 10$ *(20 pts)*

1. Find $f'(x)$, critical values, intervals where its is increasing and decreasing, coordinates of local max/min points.
2. Find $f''(x)$, intervals where it is concave up/down, inflection points, and graph of the function.

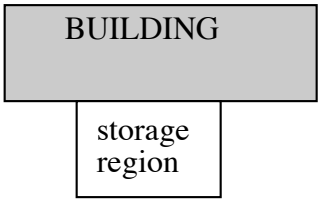
II. Given the function, $f(x) = \dfrac{6\ln(x-1)}{(x-1)^2}$ *(30 pts)*

1. Find its domain and asymptotes.
2. Find $f'(x)$, critical values, intervals where its is increasing and decreasing, coordinates of local max/min points.
3. Find $f''(x)$, intervals where it is concave up/down, inflection points, and graph of the function.

III. Find the dimensions of the rectangle with largest area that can be inscribed in the region bounded by $y = 9 - x^2$ and the x-axis as shown below.



IV. A 12,000 square foot rectangular storage region is to be built along the side of an existing building. The front of the region cost $12 per foot and the two sides of the region costs $8 per foot. What dimensions would minimize the cost of the storage region?

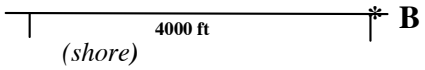


V. Scott is in the ocean at point A and wants to swim to the shore and run along the shore to point B. If he can swim at 3 f/s and run at 8 f/s, at what point on the shore should he swim to minimize the total time it takes to get from point A to point B?

The distance from point A to the shore is 500 feet.

A *

(Ocean)



(shore)

VI. Two bikers are at an intersection. One bikes north at 15 mph and one bikes east at 20 mph. After 2 hours, how far apart are the bikers and at what rate is the distance between them increasing?