Calculus I - MAC 2311 - Section 001
In-class review session Test 3
04/04/2018

Ex 1. Find two integers whose sum is 32 and product is maximum.

Ex 2. Among all rectangles with area 25 cm^2, what are the dimensions of that one that has the smallest perimeter?

Ex 3. Giovanni wants to construct a rectangular swimming pool of fixed volume 1620 cubic feet so that the width of its base is twise the lenght. On the floor he wants to use tiles that cost \$100 per square feet and on the sides he wants to use tiles that cost \$60 per square feet. Which is the minimum amount of money that Giovanni has to spend in order to build such a swimming pool? How deep would the swimming pool that minimizes the cost be?

Ex 4. Consider the function
$$f(x) = \frac{1}{x^2 - 1}.$$

a) Find the domain of definition of f.

b) Find the x- and y- intercepts.

c) Find the horizontal and vertical asymptotes.

d) Find the critical numbers of f.

e) Find the intervals over which f is increasing/decreasing and the local maximum/minimum value of f.

f) After having shown that
$$f''(x) = \frac{6x^2 + 2}{(x^2 - 1)^3},$$
find the intervals where f is concave upward/downward and the inflection points of f, if any.

g) Sketch the graph of $y = f(x)$, by using the information you collected above.

Ex 5. Find the point on the curve $y = \sqrt{x}$ which is closest to the point $(3, 0)$.