EXAM 2 - MATH 112 Friday, February 27

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Find an equation for the tangent line to the graph of $f(x) = (x+3)^5(3x+7)^2$ at $x = -2$.

2. Find an equation for the tangent line to $f(x) = \dfrac{2x^2 + x - 5}{x^2 - x + 2}$ at $x = 1$.

3. Create the combined sign table for f' and f'', clearly indicating max/min and inflection points and sketch the graph of $f(x) = x^4 - 4x^3 + 15$. Please, make sure to label points on the graph.

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

   (a) Find its domain.

   (b) Find its vertical asymptotes.

   (c) Find its horizontal asymptote.

   (d) Create the combined sign table for f', f''. You do not have to graph.

5. Suppose we know that it costs \$200 to produce a motorbike and that the fixed costs are \$1500. The price function is $p(x) = 600 - 5x$, where p is the price in dollars when x motorbikes are sold.

   (a) Find the revenue, cost and profit functions.

   $R(x) =$

   $C(x) =$

   $P(x) =$

   (b) Find the quantity that must be produced to maximize profit and the price that should be charged for maximum profit.