

EXAM 4 - MATH 151

DATE: Friday, April 13

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Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- Find the absolute minima and maxima of the following functions in the indicated interval. Justify your answers.
 - $f(x) = \frac{3x}{\sqrt{4x^2+1}}$, $[-1, 1]$ (2 points)
 - $f(x) = \sin x - \cos x$, $[0, \pi]$ (Recall that $2 \sin x \cos x = \sin 2x$.) (3 points)
- Form the sign table and indicate the positions of the relative extrema and the inflection points for the following functions. (You do not have to graph them).
 - $f(x) = x^4 - 12x^3$ (2 points)
 - $f(x) = (xe^x)^2$ (3 points)
- Find the domain, the x - and y -intercepts, the asymptotes, (1 point) form the sign table (2 points) and roughly sketch the graph (2 points) of the function $f(x) = \ln \sqrt{x^2 + 1}$.
- Find the values of a, b, c and d so that the function $f(x) = ax^3 + bx^2 + cx + d$ has a relative minimum at $(0, 0)$ and a relative maximum at $(1, 1)$. (5 points)
- A closed cylindrical can is to have a surface area of 40π square inches. Find the dimensions of the can (i.e., its radius and its height) that yield the maximum volume. (5 points)
- A rectangle is to be inscribed in a right triangle having sides 6, 8 and 10 inches. Find the dimensions of the rectangle with greatest area assuming the rectangle is positioned with two of its sides on the right triangle's vertical sides. (Ask me about this if not clear.) (5 points)