PRACTICE EXAM 4 - MATH 151

DATE: Friday, April 9
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find the domain, the intercepts, the asymptotes, create the study table and then roughly graph the function $f(x) = xe^{-x}$.

2. Find the absolute max and the absolute min of $f(x) = (x^2 + x)^{2/3}$ in the interval $[-2, 3]$.

3. Find the dimensions of the rectangle of greatest area that can be inscribed in a semicircle of radius 5 inches.

4. Verify that (**all**) the hypotheses of the Mean Value Theorem are satisfied by $f(x) = \sqrt{25 - x^2}$ on $[-5, 3]$ and find all c in the interval that satisfy the conclusion of the Theorem.

5. Compute the indefinite integrals
   (a) $\int (x^{5/7} + x^{-7/8})dx$
   (b) $\int (\frac{x^5 - 2x^3 + 1}{x^4} + 5e^x)dx$
   (c) $\int \frac{1}{1+\cos 2x}dx$ (Use $\cos 2x = 2\cos^2 x - 1$!!)

6. Compute the indefinite integrals:
   (a) $\int \frac{5x^4}{(x^5+1)^{2005}}dx$
   (b) $\int \frac{dx}{x\sqrt{1-(\ln x)^2}}$
   (c) $\int \sin(\sin x)\cos x dx$

These formulas are offered courtesy of George® for your perusal:

1. $(\sin^{-1} x)' = \frac{1}{\sqrt{1-x^2}}, -1 < x < 1$
2. $(\cos^{-1} x)' = \frac{-1}{\sqrt{1-x^2}}, -1 < x < 1$
3. $(\tan^{-1} x)' = \frac{1}{1+x^2}, -\infty < x < \infty$
4. $(\sec^{-1} x)' = \frac{1}{|x|\sqrt{x^2-1}}, 1 < |x|$