GMU MATH 113 Spring 2015
Take Home Part Final Exam

GMU Academic Dishonesty applied.
Must show all work clearly and in order, and circle your final answers.

Due on Thursday May 7, 2015 between 4:15 PM and 4:45 PM. You must hand in a hard copy in person with your GMU ID. Late work will NOT be accepted.

Justify your answers. Must work individual and no help from anyone.
To plot, you may use wolfram alpha. Do not use wolfram alpha to solve the problem, it must be done by hand.
Do not skip step. If you can not follow your logic, so do I.

Answer each question in ORDER, each problem on separate sheet of paper, write on white blank paper ONLY (NO line paper), write on one side of the page ONLY. Box you final answer.

1. Find all relative extrema, Point of inflection, intervals of increasing and decreasing and interval of concavity of \( f(x) = e^{-x^2} \)

2. Find all relative extrema, Point of inflection, intervals of increasing and decreasing and interval of concavity of \( f(x) = x \ln(x) \)

3. Find a limit \( \lim_{x \to \infty} \frac{x \ln x}{e^x} \)

4. Find \( \int \frac{2 + x^4 - x^5 + 2x^9}{5x\sqrt{x}} \, dx \)

5. Find \( \int_{\pi/6}^{\pi/4} \sec x(-3\tan x + 2 \sec x) - \frac{\sin 2x}{\sin^2 x - 1} \, dx \)

6. Find \( \frac{d}{dx} \int_{6}^{\sin(x)} -3t^2 + \frac{1}{t} \, dt \)

7. Plot (use wolfram alpha and print it) the graph and find the area under the curve by \( f(x) = 2|\sin x - \cos x| \) between \( x \in [-\pi/6, 2\pi] \).