PRACTICE PROBLEMS FOR EXAM I PART 2 MATH 230, CALCULUS II, FALL 2014
NAME:

Show all work to receive full credit.

1. The region bounded by $y = \ln x$, $x = e$, and the x-axis is rotated about the line $x = e^3$ to form a solid.
   (a) Sketch the region, labeling the coordinates of all intersections of the boundary curves.
   (b) Set up(DO NOT EVALUATE) the integral that would give the volume of the solid using the SHELL METHOD.
   (c) Set up (DO NOT EVALUATE) the integral that would give the volume using the WASHER METHOD.
2. Find the approximation for $\int_0^{\pi} \sin(x)\, dx$ with $n = 4$ by using
   (a) Left Hand Method
   (b) Right Hand Method
   (c) Midpoint Method
   (d) Trapezoidal Method
   (e) Simpson's Method
3. Suppose the Trapezoidal Method is used to approximate $\int_1^2 \ln(x)\, dx$. Will the answer be an over-estimate or an under-estimate? Explain. (A picture will help).
4. Let C be the curve defined by $x = \cos(\pi y)$ on the interval $1/4 \leq y \leq 1/2$.
   (a) Sketch C, labeling its endpoints.
   (b) Set up (DO NOT EVALUATE) an integral giving the arclength of C.
   (c) Set up (DO NOT EVALUATE) an integral giving the area of the surface created by rotating C around the y-axis.
5. Let $f(x) = \ln\left((5-x)^3\sqrt{x+4}\right)$. Find all values of x at which $f'(x) = 0$.
6. Let $g(x) = (x^2 - 20)e^{2x+3}$.
   (a) Find $g'(x)$ and factor it.
   (b) On what interval(s) is g decreasing?
7. Compute the following integrals.
   (a) $\int \frac{\sin(x)\cos(x)}{1+\cos^2(x)}\, dx$
   (b) $\int_0^4 \frac{e^{\sqrt{x}}}{\sqrt{x}}\, dx$

(c) $\displaystyle\int \frac{1}{x\ln(x^3)}\,dx$

(d) $\displaystyle\int_4^9 \frac{10^{\sqrt{x}-1}}{\sqrt{x}}\,dx$

(e) $\displaystyle\int \frac{e^x}{1+e^{2x}}\,dx$

8. Differentiate $y = (\tan(x))^x$