_____ / 50 total points

Test #2 Name: _____

Math 181, Section 4, Prof. Beydler Wednesday, October 25, 2017

Directions: Show all work. No books or notes. A **scientific calculator** is allowed. Your desk and lap must be clear (no phones, no smart watches, etc.). If you have a phone in your lap or on your chair, it is considered cheating, and you will receive a zero on this test. Write your answers in the indicated places, or box your answers. Good luck!

1. Find the following integrals. If the integral diverges, write "diverges."

   a. (6 points) $\int \frac{2x^4+6x^2+x-12}{x^3+4x}\,dx$

Answer: _____

b. (5 points) $\int x^3 e^{x^2}\, dx$

Answer: _____

c. (4 points) $\int \frac{e^{2x}}{1+e^x}\, dx$

Answer: _____

d. (4 points) $\int_2^{\infty} \frac{\ln x}{x} dx$

Answer: _____

e. (4 points) $\int_1^3 \frac{dx}{x-2}$

Answer: _____

2. (2 points) Show that the following integral either converges or diverges using the Comparison Test.
$\int_2^{\infty} \frac{\sqrt{x^4+3x+1}}{2x^3-5}\,dx$

3. Consider the integral $\int_1^3 e^{-x}\,dx$.

Trapezoidal Rule: $\int_a^b f(x)\,dx \approx \frac{\Delta x}{2}[f(x_0) + 2f(x_1) + \cdots + 2f(x_{n-1}) + f(x_n)]$

$|E_T| \leq \frac{M(b-a)^3}{12n^2}$ (M is any upper bound of $|f''|$ on $[a, b]$, and n is # of subintervals)

a. (3 points) Use the Trapezoidal Rule with $n = 4$ steps to approximate the integral to 6 decimal places.

Answer: _____

b. (3 points) How large does n need to be to guarantee that the approximation from part (a) is accurate to within 0.00001?

$n =$ _____

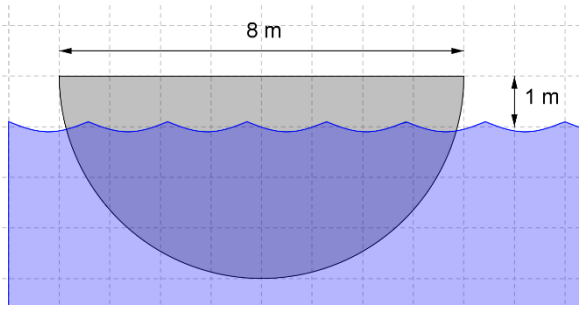
4. (5 points) Find the length of $x = \ln(\cos y)$ from $y = \frac{\pi}{6}$ to $y = \frac{\pi}{4}$.

Answer: _____

5. (5 points) Find the area of the surface generated by revolving the curve $y = 2\sqrt{x}$ from $x = 1$ to $x = 4$ about the x-axis.

Answer: _____

6. (4 points) A vertical plate in the shape of a semicircle is partially submerged in water as shown. **Set up (but do not evaluate) an integral** to find the exact hydrostatic force against one side of the plate. (Note: you can use 1000 kg/m^3 for the mass-density of water, and 9.8 m/s^2 for the acceleration due to gravity.)



Answer: _____

7. (5 points) Find the area of the region between enclosed by $x = y^2 - y$ and $x = y$. Then **set up (but do not evaluate) integrals** to find the x and y coordinates $(\bar{x}, \bar{y})$ of the centroid.

Area = _____

$\bar{x} =$ _____

$\bar{y} =$ _____

Here are a couple of formulas I promised to give you, if you need them:

$$\int \sec x \, dx = \ln|\sec x + \tan x| + C$$
$$\int \csc x \, dx = -\ln|\csc x + \cot x| + C$$