

Math 126
Summer 2014
Dr. Lily Yen

Test 3

Show all your work

Name: _____

Score: ____/34

No Calculator permitted in this part. Read the questions carefully. Show all your work and clearly indicate your final answer. Use proper notation.

Problem 1: Integrate the following.

a. $\int (x - 3)e^{-12x} dx$

Score: /3

b. $\int \frac{6x + 4}{x^2 - 1} dx$

Score: /3

c. $\int e^x \cos(x) dx$

Score: /4

Problem 2: Does the following integral converge? If so, evaluate it. If not, show where convergence fails.

$$\int_0^{\pi/2} \cot(\theta) d\theta$$

Score: /4

Problem 3: Evaluate analytically the arc length of the astroid

$$x^{2/3} + y^{2/3} = a^{2/3}, \quad a > 0.$$

Score: /4

Test 3

Show all your work

Name: _____

Calculators permitted in this part.

Problem 4: Find the volume of the solid S obtained by rotating the region R bounded by the function $f(x) = \frac{1}{(x-3)^{4/5}}$ and the x -axis on the interval $[2, 7]$ about the y -axis. Sketch the region R and a cross-sectional volume element as part of your solution.

Score: /6

Problem 5: Find the orthogonal trajectories of the families of curves where k is a parameter and sketch at least three members of each family. Label each curve with its parameter value.

$$kx^3 - y^2 = 0$$

Score: /4

Problem 6: Capilano Lake is stocked with 2000 rainbow trout, and after 1 year, the population has grown to 4500. Assuming logistic growth with a carrying capacity of 20 000, find the growth constant k (including units) and determine when the population will increase to 10 000.

Score: /6