Math 126
Summer 2015
Dr. Lily Yen

Test 2

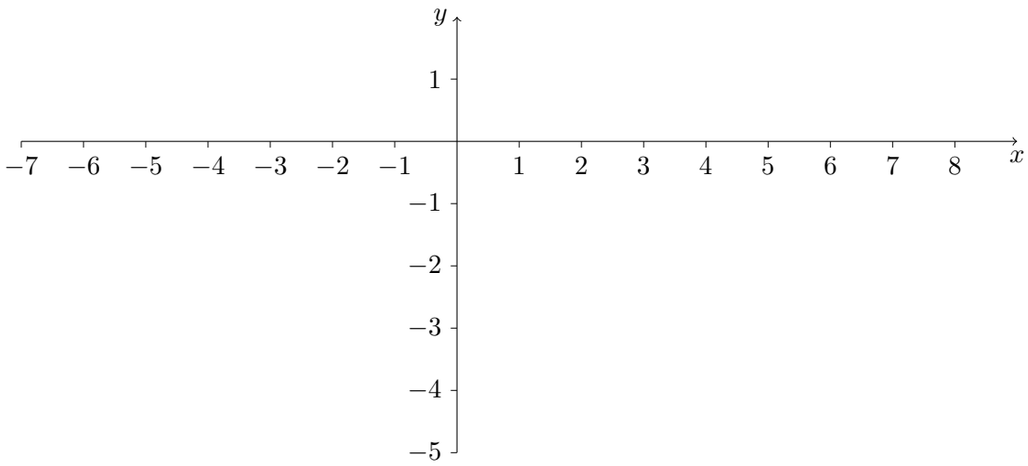
Show all your work

Name: _____

Score: ___/41

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: First draw $x + y^2 = 3$ and $x - 2y = 0$. Shade the region enclosed by these two graphs.



Score: /2

Use integrals to express the following. Do not evaluate your integrals. Draw a cross-sectional strip for each solid of rotation.

a. The area of the shaded region.

Score: /2

b. The volume obtained if the region is rotated about $y = -3$, using the method of cylindrical shells.

Score: /2

c. The volume obtained if the region is rotated about $x = 5$, using the method of slicing (washers/disks).

Score: /2

d. The volume of a solid that has the shaded region as its base, and cross-sections perpendicular to the y-axis are semi-circles.

Score: /2

e. The volume of a solid with the shaded region as its base, and cross-sections perpendicular to the x-axis are rectangles whose length above the x–y plane is twice its width on the x–y plane.

Score: /2

Problem 2: Evaluate the following integrals exactly.

a. $\displaystyle\int xe^{2x}\,dx$

Score: /3

b. $\displaystyle\int \frac{4x^2+2x-3}{(2x-5)(x+2)}\,dx$

Score: /4

c. $\displaystyle\int_2^3 \frac{1}{(x-2)^{3/4}}\,dx$

Score: /4

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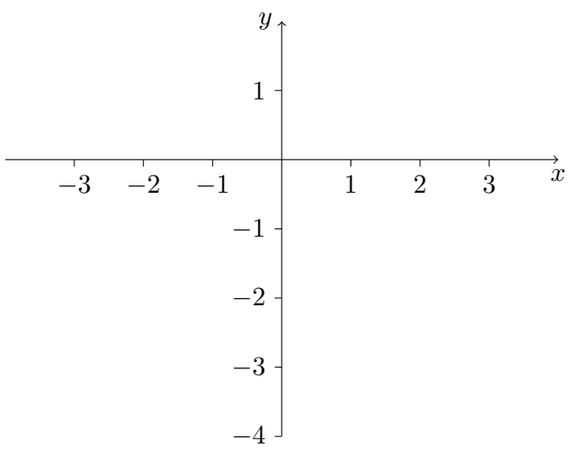
Calculators permitted from here on.

Problem 3: First, draw the following graphs on the coordinate system, then shade the region bounded by them:

$$f(x) = \sqrt{1 + \cos(x)}, \quad g(x) = \ln(\frac{x}{\pi}), \quad \text{and} \quad h(x) = -x - \pi.$$

Set up the integral for the area of the shaded region, then approximate the integral to 3 decimal places.



Score: /5

Problem 4: Find the point(s) at which the value of $f(x) = e^x/r$, $r > 0$ equals the average value of the function on the interval $[0, r]$. Hint: The coordinates are expressed in terms of r.

Score: /4

Problem 5: Find the work done by steadily lifting a leaking bucket which is full at the bottom weighing 100 pounds but only weighing 40 pounds at the top 30 feet above. Assume that the rope weighs 0.07 lb/ft and the bucket leaks at a steady rate.

Score: /5

Problem 6: Built around 2600 BC, the Great Pyramid of Giza in Egypt is 146 m high and has a square base of side 230 m. Find the work (against gravity) required to build the pyramid if the density of the stone is estimated at 2000 $\mathrm{kg/m^3}$.

Score: /4