Math 134

Quiz 5 Sample

March 16, 2011

You may use your calculator and integral tables. Indicate any calculations you do with the calculator, indicate which formula you use from the tables and the values of any constants that appear in the formula, and show your algebra whenever calculations are done by hand.

1. Determine whether the following improper integrals converge or diverge. You may evaluate the integral directly, use a comparison, or use a limit comparison. If you use a comparison, be sure to give the inequality relating the two integrals. If you use the p-test, say which version and why your conclusion is what it is.

   (a) $\int_0^\infty \frac{7}{17+e^x}\,dx$

   (b) $\int_0^3 \frac{17}{(3-x)^{5/4}}\,dx$

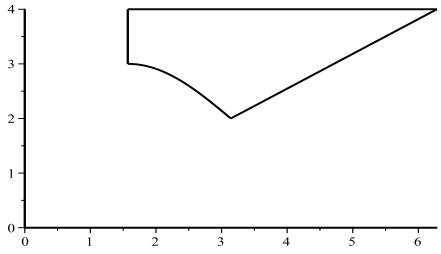


Figure 1:

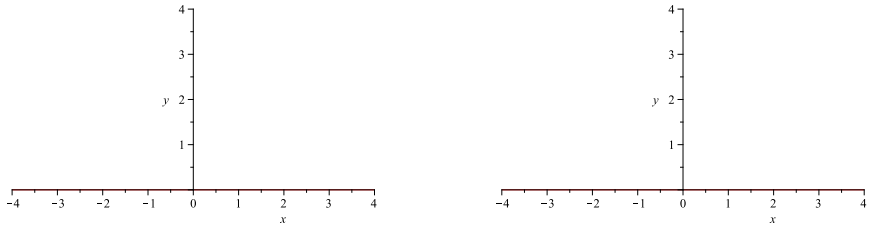
2. Figure 1 shows a region in the plane. The four sides of the region are given by the equations:

$$x = \frac{\pi}{2}, \quad y = 4, \quad y = 2 + \sin(x), \quad \text{and} \quad y = \frac{2}{\pi}x.$$

(a) Label each of the curves on the plot with the correct equation.

(b) Using the above equations, find the coordinates of the four corners of the region. Label these corners on the plot.

(c) Use integration to find the area of the region.



(a) (b)

Figure 2:

3. Let A be the region in the plane satisfying

$$0 \leq x \leq 2, \qquad 1 - \frac{1}{4}x^2 \leq y \leq 3.$$

(a) On the left set of axes above, sketch the region A.

(b) On the right set of axes above, sketch the object in space obtained by rotating A about the line $x = -1$.

(c) Compute the volume of the object from (b).