Assignment #15

Due on Wednesday, November 2, 2011

Read Section 4.9, *Solving the Logistic equation,* in the class lecture notes at `http://pages.pomona.edu/~ajr04747/`, starting on page 64.

Read Section 4.9.2, *Partial Fractions,* in the class lecture notes at `http://pages.pomona.edu/~ajr04747/`, starting on page 67.

Do the following problems

1. Evaluate the integral $\displaystyle\int \frac{y^2+1}{y^3-4y^2+y+6}\,dy$, by first finding constants A, B and C such that
$$\frac{y^2+1}{y^3-4y^2+y+6} = \frac{A}{y-2} + \frac{B}{y+1} + \frac{C}{y-3}.$$

2. Evaluate the integral $\displaystyle\int \frac{y^2-y+6}{y^3-5y^2+y-5}\,dy$, by first finding constants A, B and C such that
$$\frac{y^2-y+6}{y^3-5y^2+y-5} = \frac{A}{y-5} + \frac{By+C}{y^2+1}.$$

3. Solve the initial value problem
$$\frac{dy}{dt} = y - \frac{1}{3}y^2, \qquad y(0) = 1,$$
and sketch the solution.

4. Use partial fractions to evaluate the integral $\displaystyle\int \frac{y^3+3}{y^2-3y+2}\,dy$.

   Suggestion: First divide the denominator into the numerator to obtain
$$\frac{y^3+3}{y^2-3y+2} = y+3+\frac{7y-3}{y^2-3y+2}.$$

5. Use partial fractions to evaluate the integral $\displaystyle\int \frac{1}{1-y^2}\,dy$.