ChE/MSE 505
Advanced Mathematic for Engineers
Final Exam
Fall Semester, 2006
Instructor: David Keffer
Administered: 8:00-10:00 am, Monday December 11, 2004

Problem 1.
We want to use the following equation to fit some vapor pressure data.

$$P^{vap} = \exp\left(\frac{A}{B+T}\right) \tag{4}$$

where T is temperature and A and B are fitting constants. We have two pieces of data: the vapor pressure at 600 K is 8 atm and the vapor pressure at 620 K is 10 atm. Given this experimental data find the best values of A and B.

Problem 2. Consider the integral equation

$$\phi(x) = f(x) + \lambda\left[\int_{x_o}^{x} N(x,y)\phi(y)dy\right]$$

where

$$f(x) = x$$
$$N(x,y) = x(y+1)$$
$$\lambda = 1$$
$$x_o = 2$$

(a) Is this integral equation linear or nonlinear?
(b) Is this integral equation Volterra or Fredholm?
(c) Is this integral equation of the first or second kind?
(d) Use a numerical method to find an approximate solution to $\phi(x)$ from x_o to x_f.=4. Use a discretization step of $\Delta x = 1$. You are free to solve this as you choose, as long as you state your assumptions. However, I suggest you use the trapezoidal rule to approximate the integral, although that is not mandatory. I would like to see numerical values for the solution. There is no use for calculators in this problem.