Math 132
Worksheet 6 – February 28, 2012

Name _____

1. Evaluate the following integrals:

   (a) $\int x\sqrt{x+1}\,dx$

   (b) $\int_0^1 \tan^{-1} x\,dx$

   (c) $\int e^{\sqrt{x}}\,dx$

2. Is $y = e^x - x - 1$ a solution to the differential equation $y' = x + y$? Explain why/why not.

3. An anesthesiologist administers to a patient a constant flow of K mg/min of propofol. The half life of propofol under metabolic decay is about 45 minutes. At time $t = 0$, the amount of drug in the patient is A.

   (a) Set up a differential equation for the amount $y(t)$ of drug in the patient at time t.

   (b) Solve the differential equation from (a). Your solution will involve A and t.

   (c) Find the limit $L = \lim_{t\to\infty} y(t)$.

   (d) The dose of propofol required for the intended sedation is relatively close to the lethal dose, making propofol a somewhat dangerous drug. (It is one of the drugs that was administered to Michael Jackson on the night of his death.)

   Assume that the initial amount $A = 0$. What should the anesthesiologist set K to if she wants L to be 30mg? With this value of K, will y ever go above the estimated lethal dose of 45mg? What changes if instead $A = 10$?