Exam II Name _____

1. Integrate the following

(a) $\int 4xe^{-3x}\,dx$

(b) $\int \cos^3 2x\,dx$

(c) $\int \frac{dx}{\sqrt[3]{x}+x}$

(d) $\int \sqrt{9-x^2}\,dx$

(e) $\int \dfrac{x^2+4x-8}{x^2-5x+4}\,dx$

2. Tell whether the integral converges or diverges. If it converges, give the limit. If it diverges, show why.

   (a) $\displaystyle\int_2^\infty \frac{dx}{(x-1)^2}$

   (b) $\displaystyle\int_2^{10} \frac{dx}{(x-2)^{3/2}}$

   (c) $\displaystyle\int_0^\infty \frac{1}{1+9x^2}\,dx$

3. Solve the following differential equation for y.

(a) $y' - y^2 e^{2x} = 0$ $y(0) = 1.$

(b) $y' + \dfrac{y}{10+t} = 6$ $y(0) = 2.$

4. Suppose your bank offers 3% continual annual interest on the balance of your certificate of deposit but you make a continual withdrawal of \$300 per year.

   (a) Write a differential equation giving the balance of your CD at any time t. Let $B(t)$=balance at time t.

   (b) Solve this differential equation and give the minimum initial (and only) deposit so that your funds are not depleted over time.

   (c) Determine $B(t)$ if you initially deposit $\$12,000$ and do not depoit again.