Math 2C03E - Differential Equations
More practice Term Test-1, Spring/Summer 2012

Record your answer by circling **ONE** and **ONLY ONE** of the letters.

1. (4 pts) An integrating factor in the form $\mu(x)$ for the following differential equation

$$(y + 2x^2)dx + x(xy - 1)dy = 0$$

is:
(A) $\mu(x) = x^{-1}$

(B) $\mu(x) = x^{-2}$

(C) $\mu(x) = x^2$

(D) $\mu(x) = e^x$

(E) $\mu(x) = xe^x$

2. (4 pts) The differential equation $(2xy + x^2 + x^4)dx + (1 + x^2)dy = 0,$ is:

(A) homogeneous and exact.

(B) homogeneous and linear in y.

(C) exact and linear in y.

(D) separable and homogeneous.

(E) separable and exact.

3. (4 pts) Let $y(x)$ be the unique solution to the initial value problm

$$y' = y^2(y + 2), \qquad y(0) = a.$$

For which one of the values of a listed below, does the solution $y(x)$ satisfy

$$\lim_{x \to +\infty} y(x) = 0?$$

(**Hint**: Consider the phase line. Do not try to solve the ODE.)

(A) $a = 4$

(B) $a = 1$

(C) $a = -1$

(D) $a = -4$

(E) $a = -6$

4. (10 pts) Solve the following ordinary differential equation and initial-value problem:

$$x\sqrt{1+y^2}dx = y\sqrt{1+x^2}dy, \qquad y(0) = \sqrt{3}.$$

5. (10 pts) Find the general solution of the ordinary differential equation:

$$x\frac{dy}{dx} - y = x^2\cos(x).$$

6. (10 pts) Find the general solution of the ordinary differential equation:

$$\frac{dy}{dx} = 2\cos(x) - y\cos(x).$$