Multiple Choice

1 (10 pts)
Find the general solution to the differential equation

$$(y + \sin(x))dx + (x + 2y - 3y^2)dy = 0$$

(a) $2xy - \cos(x) + y^2 - y^3 = C$

(b) $xy - \sin(x) + 2y^2 - 3y^3 = C$

(c) $2xy - \cos(x) + 2y^2 - y^3 = C$

(d) $xy - \cos(x) + y^2 - y^3 = C$

(e) $2xy + \cos(x) + y^2 - y^3 = C$

2 (10 pts)
Consider the Bernoulli equation

$$\frac{dy}{dx} - \frac{2}{3x}y = 2y^3 \ln x$$

After an appropriate substitution, the equation becomes

(a) $\frac{dv}{dx} + \frac{4}{3x}v = -4 \ln x$

(b) $\frac{dv}{dx} + \frac{4}{3x}v = 2 \ln x$

(c) $\frac{dv}{dx} + \frac{2}{3x}v = -2 \ln x$

(d) $\frac{dv}{dx} - \frac{2}{3x}v = -2 \ln x$

(e) $\frac{dv}{dx} - \frac{4}{3x}v = 2 \ln x$