

Quiz 1:

Name: _____

MAP 2302 (Sec 0693)

This Quiz contains 2 problems 11 points each. 3 points for writing your name.

Calculators are allowed.

Total Points: 25

1. Solve the following equation:

$$\frac{dy}{dt} = -\frac{1+\ln(y)}{t/y}$$

Method 1:

$$t/y dy + (1 + \ln(y))dt = 0$$

$$N dy + M dt = 0$$

We observe $\frac{\partial M}{\partial y} = \frac{1}{y} = \frac{\partial N}{\partial t}$. Hence this is an exact equation.

$$F = \int t/y dy + \phi(t) = t \ln(y) + \phi(t)$$

$$\frac{\partial F}{\partial t} = \ln(y) + \phi'(t) = 1 + \ln(y)$$

$$\phi'(t) = 1$$

$$\phi(t) = t$$

Solution $F = t \ln(y) + t = c$

Method 2:

Separable :

$$\frac{dy}{y(1 + \ln(y))} = \frac{dt}{t}$$

$$\ln(1 + \ln(y)) = \ln(t) + c$$

2. Solve the following linear equation.

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

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

$$I.F = \mu = e^{3\ln(x)} = x^3$$

$$d(yx^3) = (-2 - 3x)x^3 dx$$

$$yx^3 = -\frac{x^4}{2} - \frac{3x^5}{5} + c$$