

Math 274 Quiz 1

Sections: 1.1-2.1

31 August 2018

Name: _____

Point values in .

1. [4] Find a general solution of

$$x' = se^{-2s}.$$

$$x = \int se^{-2s} ds \quad u = s \quad du = ds \quad dv = e^{-2s} ds \\ v = -\frac{1}{2}e^{-2s}$$

$$x = -\frac{s}{2}e^{-2s} + \frac{1}{2} \int e^{-2s} ds$$

$$x(s) = -\frac{s}{2}e^{-2s} - \frac{1}{4}e^{-2s} + C$$

2. [4] Show $y(x) = \frac{\sin x + c}{x^2}$ is a one-parameter family of solutions to

$$x^2y' + 2xy = \cos x.$$

$$y' = \frac{x^2 \cos x - (\sin x + c)2x}{x^4}$$

so

$$x^2y' + 2xy = \frac{x^2 \cos x - 2x \sin x - 2xc}{x^2} + \frac{2x(\sin x + c)}{x^2}$$

$$= \frac{x^2 \cos x}{x^2} = \cos x \quad \checkmark$$

3. [2] Find c so that $y(x) = \frac{\sin x + c}{x^2}$ solves the initial value problem

$$x^2y' + 2xy = \cos x, \quad y(\pi) = 1.$$

$$1 = \frac{\sin \pi + c}{\pi^2} \quad \text{so} \quad c = \pi^2$$

$$y(x) = \frac{\sin x + \pi^2}{x^2} \quad \text{solves the initial value problem.}$$