

Score:

Name:

Solutions

Period (circle one): 1 2 3 4 5 6

Team (circle one): a b c d e f

SM286 - DiffEq - Quiz 2 - Sections
Solutions to 1st Order DEs

Separation
of Variables

1. Solve $\frac{dy}{dx} = -2xy^2$, $y(2) = 1$.

$$\int \frac{dy}{y^2} = \int -2x dx \Rightarrow -\frac{1}{y} = -x^2 + C$$

$$\Rightarrow \frac{1}{y} = x^2 + C \Rightarrow y = \frac{1}{x^2 + C} \Rightarrow y(2) = \frac{1}{4 + C} = 1 \Rightarrow C = -3$$

$$\Rightarrow \boxed{y = \frac{1}{x^2 - 3}}$$

note: 'C' must be carried
to denominator w/ 'x²'

Integrating
Factor

2. Solve $\frac{dy}{dx} = e^{3x} - 2y$.

put in standard form

$$\frac{dy}{dx} + 2y = e^{3x} \Rightarrow u(x) = e^{\int 2 dx} = e^{2x}$$

$$\Rightarrow e^{2x} \frac{dy}{dx} + 2e^{2x} y = e^{5x}$$

$$\Rightarrow \int \frac{d}{dx} [e^{2x} y] = \int e^{5x} dx \Rightarrow e^{2x} y = \frac{1}{5} e^{5x} + C$$

$$\Rightarrow \boxed{y = \frac{1}{5} e^{3x} + C e^{-2x}}$$