

Name SOLUTIONS

Find explicit solutions to the following initial value problems.

1. (2 points)  $\frac{dw}{dr} = 0.6r$      $w(0) = 8$

$$dw = 0.6r dr$$

$$\int dw = \int 0.6r dr$$

$$w = 0.3r^2 + C$$

$$8 = 0.3(0)^2 + C$$

$$C = 8$$

$$w = 0.3r^2 + 8$$

2. (3 points)  $\frac{dr}{dw} = 0.6r$      $r(0) = 8$

$$\frac{1}{r} dr = 0.6 dw$$

$$\int \frac{1}{r} dr = \int 0.6 dw$$

$$\ln r = 0.6w + C$$

$$\ln 8 = 0.6(0) + C$$

$$C = \ln 8$$

$$\ln r = 0.6w + \ln 8$$

~~$$r = 8e^{0.6w}$$~~

$$r = e^{0.6w + \ln 8}$$

$$r = e^{0.6w} \cdot e^{\ln 8}$$

$$r = 8e^{0.6w}$$



COUNT JUST  
MEMORIZE

3. (5 points)  $\frac{dy}{dx} = 15x^2e^{-y}$ ,  $y(0) = 2$

$$\frac{dy}{dx} = \frac{15x^2}{e^y}$$

$$e^y dy = 15x^2 dx$$

$$\int e^y dy = \int 15x^2 dx$$

$$e^y = 5x^3 + C$$

$$e^2 = 5(0)^3 + C$$

$$C = e^2$$

$$e^y = 5x^3 + e^2$$

$$y = \ln(5x^3 + e^2)$$