QUIZ 5 SOLUTIONS: LESSONS 7-8
FEBRUARY 3, 2017

Write legibly, clearly indicate the question you are answering, and put a box or circle around your final answer. If you have any questions, raise your hand and I will come over to you.

1. [5 pts] Find the general solution to

$$\frac{dy}{dt} + y = 0.$$

(Use A or C as an arbitrary constant.)

Solution: We write

$$\frac{dy}{dt} + y = 0$$

$$\Rightarrow \quad \frac{dy}{dt} = -y$$

$$\Rightarrow \quad \frac{1}{y}\,dy = -dt$$

$$\Rightarrow \quad \int \frac{1}{y}\,dy = \int -dt$$

$$\Rightarrow \quad \ln|y| = -t + C$$

$$\Rightarrow \quad e^{\ln|y|} = e^{-t+C}$$

$$\Rightarrow \quad |y| = e^{-t}e^{C}$$

$$\Rightarrow y = Ae^{-t}.$$

2. [5 pts] Find the general solution to

$$xyy' = 5.$$

(Use A or C as an arbitrary constant.)

    <u>Solution</u>: Write

$$xyy' = 5$$

$$\Rightarrow \quad yy' = \frac{5}{x}$$

$$\Rightarrow \quad y\frac{dy}{dx} = \frac{5}{x}$$

$$\Rightarrow \quad y\,dy = \frac{5}{x}\,dx$$

$$\Rightarrow \quad \int y\,dy = \int \frac{5}{x}\,dx$$

$$\Rightarrow \quad \frac{1}{2}y^2 = 5\ln|x| + C$$

$$\Rightarrow \quad y^2 = 10\ln|x| + 2C$$

$$\Rightarrow \quad y = \sqrt{10\ln|x| + 2C}$$

$$= \sqrt{10\ln|x| + A}$$