MATH 046 020-QUIZ 2, SPRING 2018

Name: KEY

1 (5 pts). Find the general solution of the ODE:

$$dx - \frac{1}{y^2 - 6y + 13} dy = 0.$$

$$\Rightarrow \frac{1}{y^2-6y+13}\, dy = dx$$

$$\frac{1}{(y-3)^2+4}\, dy = dx$$

$$\Rightarrow \int \frac{1}{(y-3)^2+4}\, dy = \int dx$$

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

$$\Rightarrow \boxed{y(x) = 3 + 2\tan(2x+2C)}$$

2 (5 pts). The population of a city is known to grow at a rate proportional to the number of people presently living in this city. Suppose the annual rate is 3% and the population is 500000 in the year 2018. Can you compute the population at the year 1998? (You have to find the suitable IVP of some ODE that models this problem. Then you have to solve this IVP. Please show all your work in order to get full credit. You may use $e^{-0.6} = 0.55$ and use 1 for 100000, just don't forget to put the four zeros back for your final answer.)

* See other version for solution