Math 275 - Differential Equations
TBA Quiz #1

Name _________________________  Date __________

Question 1.

Suppose that the growth-rate parameter $k = 0.3$ and the carrying capacity $N = 2500$ in the logistic population model of Exercise 17. Suppose $P(0) = 2500$.

(a) If 100 fish are harvested each year, what does the model predict for the long-term behavior of the fish population? In other words, what does a qualitative analysis of the model yield?

(b) If one-third of the fish are harvested each year, what does the model predict for the long-term behavior of the fish population?

Question 2.
Solve the initial value problem:

$$\frac{dy}{dt} = ty^2 + 2y^2, \quad y(0) = 1$$

Question 3.

Suppose the constant function $y(t) = 2$ for all $t$ is a solution of the differential equation

$$\frac{dy}{dt} = f(t, y).$$

(a) What does this tell you about the function $f(t, y)$?

(b) What does this tell you about the slope field? In other words, how much of the slope field can you sketch using this information?

(c) What does this tell you about solutions with initial conditions $y(0) \neq 2$?