

MATH 2300-004 QUIZ 11 [take-home portion] Name: \_\_\_\_\_

The following variation on the logistic equation models logistic growth with constant harvesting:

$$\frac{dP}{dt} = kP(1 - P/M) - c.$$

For this problem consider the specific instance

$$\frac{dP}{dt} = 0.08P(1 - P/1000) - 15,$$

modeling fish population in a pond where 15 fish per week are caught (time  $t$  in weeks).

1. What are the equilibrium solutions to the differential equation in part (i.e. what are the constant solutions)?
2. Find the general solution of the differential equation. [Integrate using partial fractions. You should get something equivalent to  $P(t) = \frac{750 - 250Ce^{-t/25}}{1 - Ce^{-t/25}}$  where  $C$  is an arbitrary constant.]
3. Find and interpret the solutions with initial conditions  $P(0) = 200, 300$ .