

MTH 3311 - Test 2A

FALL 2018

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Name _____

1. The force of water resistance acting on a boat is proportional to its instantaneous velocity, and is such that at $40 \frac{\text{ft}}{\text{sec}}$ the water resistance is 80 lb. If the boat and passengers combined weigh 640 lb, and if the motor exerts a steady force of 100 lb in the direction of the motion:
 - (a) Find the velocity at any time $t \geq 0$, assuming that the boat starts from rest.
 - (b) Find the limiting velocity

2. Water at temperature 180°F cools in 20 minutes to 100°F in a room at temperature 40°F .
- (a) Find the temperature T at any time $t \geq 0$ (Our answer will probably have to be expressed in terms of a natural logarithm)
 - (b) Find the temperature at time $t = 40$ min

3. The demand and supply of a certain commodity are given in terms of thousands of units, respectively, by:

$$D = 60 - 9p(t) - 5p'(t); \quad S = 180 - 3p(t) - 8p'(t)$$

At time $t = 0$; the price of the commodity is 10 units

- (a) Find the price at any later time and obtain its graph.
- (b) Determine whether there is price stability and the equilibrium price if one exists.