

MTH 3311 - Test #2

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Name _____

From the exercises below, do two.

1. It's really hot out. I've been clearing brush for hours and I'm really thirsty. I come inside to get a cold beer from the "fridge," and there's no beer in the "fridge" – I forgot to put the beer in there! (Where on earth are my priorities?) I have some cans of beer on the kitchen counter, but they're at room temperature (80°F – Yeah, I forgot to turn on the AC also!) I put a few cans of beer in the freezer, which is kept at a constant -10°F . At $T = 10$ minutes later, the temperature of each beer is 60°F . How long (starting from the time that I put the beer in the freezer) will it take for my beer to be at a temperature of 28°F ? (Leave your answer in terms of natural logs.)

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

$$D = 50 + 12p(t) + 2p'(t); \quad S = 450 - 8p(t) - 2p'(t).$$

At $t = 0$, the price of the commodity is 40 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.
3. The force of water resistance acting on a boat is proportional to its instantaneous velocity, and is such that at $30 \frac{\text{ft}}{\text{sec}}$ the water resistance is 90 lb. If the boat and passengers combined weigh 960 lb, and if the motor exerts a steady force of 120 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