QUEEN'S UNIVERSITY
APSC 171J – Assignment 6
Wesley Burr
Due: Not for Grade (do before Final!)

INSTRUCTIONS

- This assignment includes three problems to help you prepare for the final exam.
- As announced in class, there will be a differential equation problem on the final. Since we did not have time to cover the material **and** include it on assignment 5, these questions are intended to fill in that gap and give you a chance to practice.
- Solutions will be posted.

FOR INSTRUCTOR'S USE ONLY		
Question	Mark Available	Received
1	4	
2	4	
3	4	
TOTAL	12	

1. [4 marks] Suppose that a cup of coffee is left on a table. A thirsty mathematician finds this cup of (cold) coffee and measures its temperature to be 32° C. The room the cup was in is kept at a constant 20° C. Considering the coffee too cold to drink, the mathematician walks away. Three hours later, he realizes the cup is still sitting on the table, having dropped in temperature to 27° C. If coffee comes out of the coffee maker at 60° C, how many hours ago was the cup left on the table?

Final Answer:

2. [4 marks] Suppose a corpse is discovered in a motel room at midnight, and its temperature is $80°$ F. The room is kept at a constant $60°$ F. Two hours later the temperature of the corpse (which has not been moved) has dropped to $67°$ F. Find the time of death. Note that the human body usually sits at $98.6°$ F when in good health.

Final Answer:

3. [4 marks] Newton's Law of Cooling says that the rate at which an object heats or cools is proportional to the difference between the temperature of the object and its surroundings. Translate this into a mathematical equation. If a cup of coffee at 100° C is placed on a table in a room whose temperature is 20° C, and it is observed at a later point that the coffee is cooling at a rate exactly half that of its initial cooling rate (i.e., $0.5 \times dT(0)$), calculate the temperature of the coffee at that point.

Final Answer: