Assignment # 2 **DE** **Due Date: 30th Nov 2023**

Q1. There has been a murder! A corpse was discovered in a motel room at midnight (12 am) and its temperature was 82°F . The temperature of the room is kept constant at 62°F . Two hours later the temperature of the corpse dropped to 75°F . We know that temperature of a healthy person is 98.6°F.

a. Write a model for the given scenario.

b. Find the time of death.

Q2. Researchers claim that the rate at which a person loses weight by exercising is directly proportional to his/her current weight at time t if certain factors are ignored. If a person is severely obese, he will lose weight faster than the person who is slightly overweight.

a. Write the model for the given scenario.

b. A person weighing 240 lbs. joins the gym, and loses 20 lbs. in next 4 months. For how long does he need to go to gym so that he weighs 160 lbs.? (Certain factors are ignored.)

c. What would be his weight if he continues gym for 0.75 year?

Q.3 Solve the following Differential equations

$$(i).\ (x^2+1)\frac{dy}{dx}+2xy=4x^2$$

$$(ii).\ \left(\frac{x+y}{y-1}\right)dx-\frac{1}{2}\left(\frac{x+1}{y-1}\right)^2 dy=0$$

$$(iii)\ (3x^2y^4+2xy)dx+(2x^3y^3-x^2)dy=0$$