Math 220 – Section 1.1 Solutions

1. $5\dfrac{d^2x}{dt^2} + 4\dfrac{dx}{dt} + 9x = 2\cos 3t$
   - ODE, order is 2, t is independent, x is dependent, linear

2. $\dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} + 2y = 0$
   - ODE, order is 2, x is independent, y is dependent, linear

3. $\dfrac{dy}{dx} = \dfrac{y(2-3x)}{x(1-3y)}$
   - ODE, order is 1, x is independent, y is dependent, nonlinear

4. $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$
   - PDE, order is 2, x and y are independent, u is dependent

5. $y\left[1 + \left(\dfrac{dy}{dx}\right)^2\right] = C$
   - ODE, order is 1, x is independent, y is dependent, nonlinear

6. $\dfrac{dx}{dt} = k(4-x)(1-x)$
   - ODE, order is 1, t is independent, x is dependent, nonlinear

7. $\dfrac{dp}{dt} = kp(P-p)$
   - ODE, order is 1, t is independent, p is dependent, nonlinear

8. $\sqrt{1-y}\dfrac{d^2y}{dx^2} + 2x\dfrac{dy}{dx} = 0$
   - ODE, order is 2, x is independent, y is dependent, nonlinear

9. $x\dfrac{d^2y}{dx^2} + \dfrac{dy}{dx} + xy = 0$
   - ODE, order is 2, x is independent, y is dependent, linear

15. The rate of change in the temperature T of coffee at time t is proportional to the difference between the temperature M of the air at time t and the temperature of the coffee at time t:

$$\frac{dT}{dt} = k(M-t)$$