Instructions. Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

Problem 1. (3 points) Determine whether the following differential equations is linear.

- (a.) $y' + (x^2 + \cos x)y = x$
- (b.) yy' = x
- (c.) $y' xy = x^2y + 3$

Problem 2. (4 points) A 400-gallon tank initially contains 200 gallons of water and 40 pounds of salt. A solution containing 3 pounds of salt per gallon enters the tank at a rate of 3 gallons per minute, and the well-stirred mixture flows out of the tank at a rate of 3 gallons per minute. How many pounds of salt are in the tank 10 minutes later? Round your answer to 2 decimal places.

Problem 3. (3 points) Set up but **do not compute** an integral that gives the area of the region R bounded by

$$f(x) = \frac{16}{x}$$
 and $g(x) = -9x + 30$.