QUIZ 1 - MATH 310 Thursday, January 27

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Read each problem **very carefully** before starting to solve it and do only what is asked. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [6 points] Solve the initial value problem

$$t\frac{dy}{dt} - 3y = t^4 + t, \quad y(1) = 2.$$

2. [6 points] A tank contains initially 100 gallons of water with 20 pounds of salt mixed in it. Salted water, containing 2 pounds of salt per gallon, is poured into the tank at the rate of 1 gallon/minute, while the mixture is being emptied from the tank at the rate of 2 gallons/minute. Write and solve a differential equation to find the amount $Q(t)$ of salt in the tank at time t. (Note, your equation will be valid only for $0 \leq t \leq 100$, since after 100 minutes the tank will be empty.)