Name: ─────────────────────────────   ─────── / 25

Circle one: **Faudree (F01)** | **Bueler (F02)** | **VanSpronsen (UX1)**

25 points possible. No aids (book, calculator, etc.) are permitted. You need not simplify, but show all work and use proper notation for full credit.

1. **[8 points]** A drone flying horizontally at an altitude of 20 meters and speed of 30 m/s passes directly over a radar station. Find the rate at which the distance from the drone to the station is changing 2 seconds after the drone passes above the station.

   [To earn full credit you need to: Draw and label a picture. Write your solution in an orderly, easy-to-follow manner. Clearly identify your answer. Include units.]

2. [8 points] Let $y = 3\sqrt[3]{x}$.

    a. Find the linearization, $L(x)$, of $y = 3\sqrt[3]{x}$ at $x = 1000$.

    b. Use the linearization from part (b) to estimate $\sqrt[3]{999}$. Write your answer in decimal form.

3. [9 points] The half-life of Strontium-90 is 28 days.

    a. Suppose a sample has an initial mass of 30 mg. Find a formula for the mass remaining after t days.

    b. How long would it take for the sample to decay to a mass of 2 mg?

    c. Sketch the graph of the mass function.