

5. [12 points] A certain type of spherical melon has weight proportional to its volume as it grows. When the melon weighs 0.2 pounds, it has a volume of 36 cm^3 and its weight is increasing at a rate of 0.1 pounds per day. [Note: The volume of a sphere is $V = \frac{4}{3}\pi r^3$.]
- a. [3 points] Find $\frac{dV}{dt}$ when the melon weighs 0.2 pounds (t measured in days).
- b. [5 points] Find the rate at which the radius of the melon is increasing when it weighs 0.2 pounds.
- c. [4 points] Use a local linearization to approximate the volume of the melon 36 hours after it weighs 0.2 pounds.