1. The blob doubles its size every 40 minutes. If it weighs 2 pounds now, when will it be a ton (2000 lbs)?

2. Solve the following differential equations given that the graph of each solution goes through the point (3,14).

(a) \[ \frac{ds}{dz} = 12z \]

(b) \[ \frac{ds}{dz} = 12s \]
3. Technetium-99m is a radioactive isotope used in medical imaging tests as a radioactive tracer. It has a half-life of about 6 hours. What percentage of the isotope will remain after 24 hours?

4. (#30 from Section 3.7 in the textbook) The frequency of vibrations of a vibrating violin string is given by

\[ f = \frac{1}{2L} \sqrt{\frac{T}{\rho}} \]

where \( L \) is the length of the string, \( T \) is its tension, and \( \rho \) is its linear density.

(a) Find the rate of change of the frequency with respect to

i. the length (when \( T \) and \( \rho \) are constant),

ii. the tension (when \( L \) and \( \rho \) are constant)

iii. the linear density (when \( L \) and \( T \) are constant)

(b) The pitch of a note (how high or low it sounds) is determined by the frequency \( f \). Use the signs of the derivatives in part (a) to determine what happens to the pitch of a note

i. when the length of a vibrating string is decreased by placing a finger on the string,

ii. when the tension is increased by turning a tuning peg,

iii. when the linear density is increased by switching to a thicker string.