

Instructions: Show all work. Use exact answers unless specifically asked to round.

1. Polonium-210 has a half-life of about 140 days. Find the decay constant. What fraction of the original amount of a sample of polonium-210 remains after 1 year (365 days)?

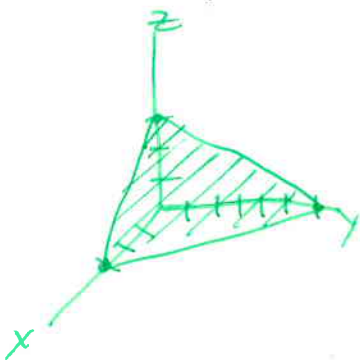
$$k = \frac{-\ln 2}{140} \text{ in days.}$$

$$P = P_0 e^{kt} \quad \text{let } P_0 = 1$$

$$P = 1 e^{\frac{-\ln 2}{140}(365)} \approx .164$$

16.4% remains

2. Sketch the graph of the equation $2x + y + 2z = 6$.



x-int (3, 0, 0)

y-int (0, 6, 0)

z-int (0, 0, 3)

3. Evaluate each function at the given point.

a. $f(x, y) = 3x^2y - 4y$ at $P(2, -1)$

$$f(2, -1) = 3(2)^2(-1) - 4(-1) = -12 + 4 = \boxed{-8}$$

b. $f(x, y, z) = x^2yz + xy^2z + xyz^2$, at $P(3, 1, -2)$

$$(3)^2(1)(-2) + 3(1)^2(-2) + (3)(1)(-2)^2 = \\ -18 - 6 + 12 = \boxed{-12}$$