Mathematics 122

Quiz 7 Name: Key

You must show your work to get full credit.

1. Strontium-90 (^{90}Sr) has a half life of 28.8 years.

(a) Let $P(t)$ be the percent of a sample of ^{90}Sr that is left after t years. Give a formula for $P(t)$.

$P(t) =$ $100(.9762)^t$

$P(0) = 100\%$ so

$P(t) = 100a^t$

$P(28.8) = 100a^{28.8} = \frac{1}{2}(100)$

$a^{28.8} = .5$ → $a = (.5)^{(1/28.8)} = .9762$

(b) Strontium-90 was one of the products of the Chernobyl disaster. How many years before there is only 10% of the original ^{90}Sr left?

$t =$ 95.59 years.

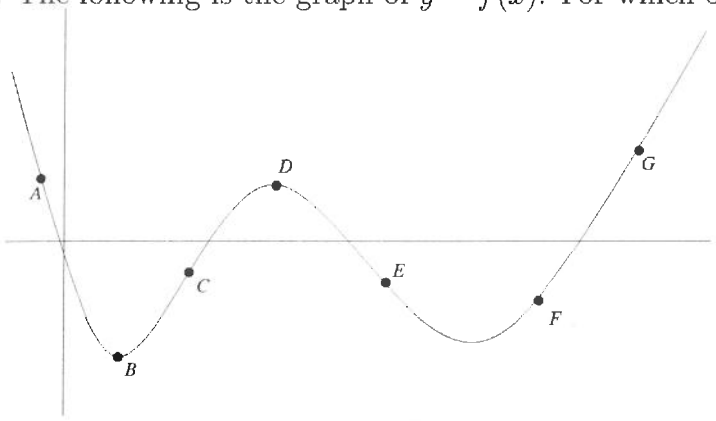
Solve

$P(t) = 100(.9762)^t = 10$

$(.9762)^t = .1$

$t\ln(.9762) = \ln(.1)$ → $t = \ln(.9762)/\ln(.1) = 95.59$

2. The following is the graph of $y = f(x)$. For which of the labeled points



$f(x) > 0$? A, D, G

$f(x) < 0$? B, C, E, F

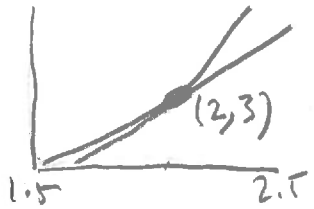
$f'(x) > 0$? C, F, G

$f'(x) = 0$? A, E

$f'(x) < 0$? B, D

3. For the function $g(t) = \sqrt{t^3 + 1}$.

(a) Plot $y = g(t)$ for $1.5 \le t \le 2.5$ and draw the result here and draw the tangent line where $t = 2$.



(b) Compute $\dfrac{g(2+h) - g(2)}{h}$ where $h = .0001$. Result: 2.00003333

(c) Write a sentence or two explaining the answer (b) is a good approximation to $g'(2)$.

This difference quotient will be very close to the slope of the tangent line.