CONTINUOUS RANDOM VARIABLES: PRACTICE 2; EXPONENTIAL DISTRIBUTION

STUDENT LEARNING OUTCOMES:

• THE STUDENT WILL EXPLORE THE PROPERTIES OF DATA WITH A EXPONENTIAL DISTRIBUTION.

GIVEN:

Carbon-14 is a radioactive element with a half-life of about 5730 years. Carbon-14 is said to decay exponentially. The decay rate is 0.000121. We start with 1 gram of carbon-14. We are interested in the time (years) it takes to decay carbon-14.

DATA

| 1. | What is | being | measured | here? |
|----|---------|-------|----------|-------|
| | | | | |

- 2. Are the data discrete or continuous?
- 3. In words, define the Random Variable X.

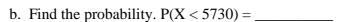
$$X \equiv$$

- 4. What is the decay rate? $m = \underline{\hspace{1cm}}$
- 5. The distribution for X is: X ~ _____

GRAPHING

- 6. Find the amount (percent of 1 gram) of carbon-14 lasting less than 5730 years. This means, find P(X < 5730).
 - a. Sketch the graph. Shade the area of interest.





- 7. Find the percent of carbon-14 lasting longer than 10,000 years.
 - a. Sketch the graph. Shade the area of interest.



- b. Find the probability. P(X > 10,000) =
- 8. 30 percent of carbon-14 will decay within how many years?
 - a. Sketch the graph. Shade the area of interest.



b. Find the value k such that P(X < k) = 0.30. k =