Name: ____

Exponential Curve

1. Refer to Fig. 19.2. *Consider the equations:*

$$y = Ae^{(C \cdot x)} + B$$
$$N = N_0 e^{(\lambda t)}$$

   What is N_0 [*i.e.* $N_{t=0}$]? (*You may read the information directly from the auto-fit box.*) (10 pts)

2. Refer to Fig. 19.3, below. The *doubling-time* is the time it takes for the initial number or amount to double. What is the doubling-time ($N = 2N_0$)? (*Find the value on the y-axis, then move horizontally until you intersect the plot. Drop a perpendicular line to the x-axis and read the time.*) (20 pts)

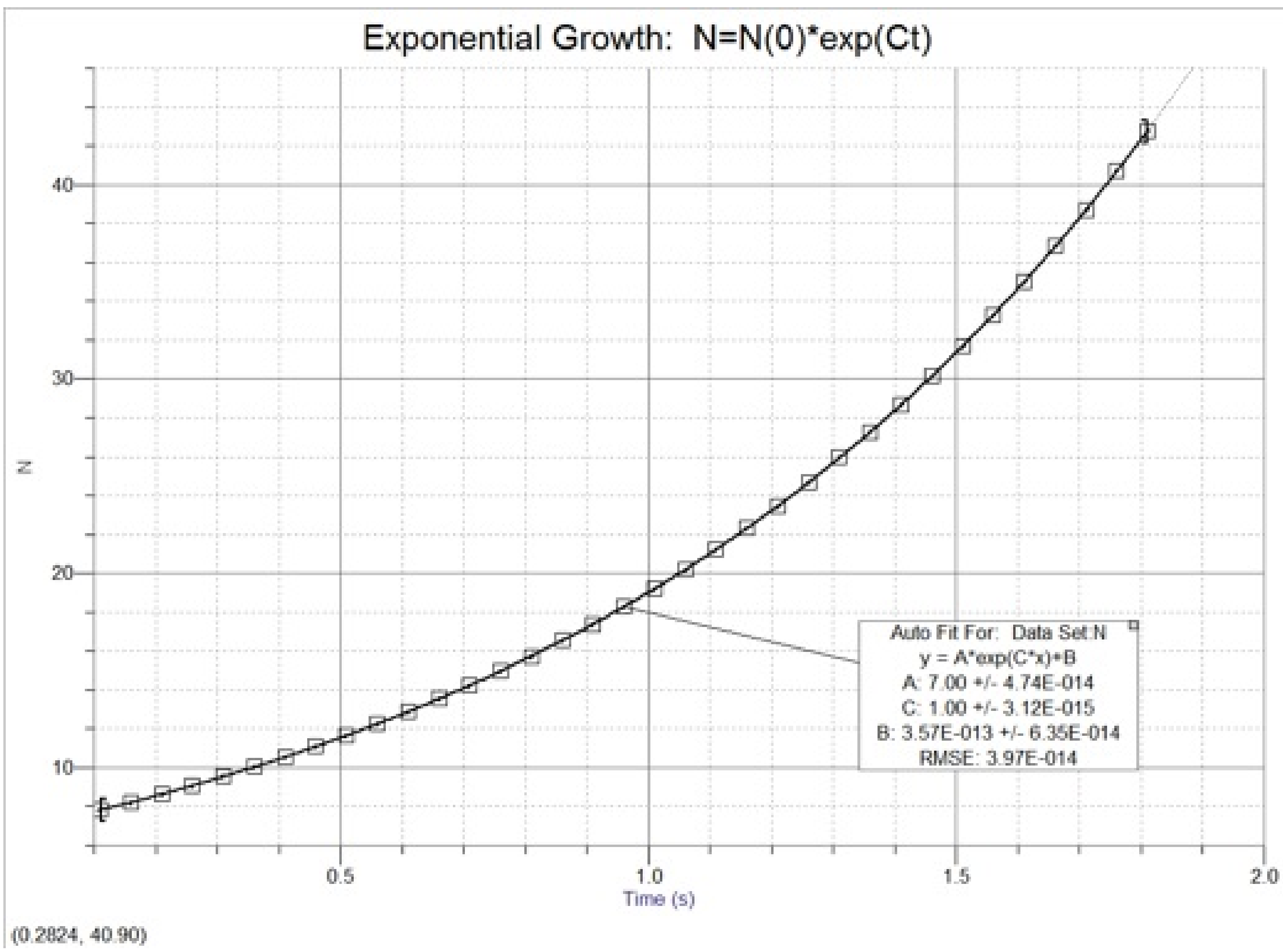

Figure 19.3: Exponential Growth

Radioactive Decay - Carbon Dating (30 pts)

Assume Fig. 19.4 represents 100% of the carbon found in all living matter. Carbon 14 (^{14}C) has a half-life ($T_{1/2}$) of 5,730 years. The square represents a sample of ^{14}C. ^{14}C emits β^- particles.

3. Divide the square in half with a vertical line and write "5,700 yrs" (rounded for simplification) on the left side, to represent the amount of ^{14}C decayed after its half-life of 5,700 years ($T_{1/2} = 5,700$ yrs).

4. Now divide the right side in half with a horizontal line and write "11,400 yrs" to represent the amount of ^{14}C decayed after an additional half-life.

5. Continue to divide the remaining sample in this manner to show the amount of ^{14}C decayed after 17,100 yrs; 22,800 yrs; 28,500 yrs; 34,900 yrs; and 45,600 yrs.

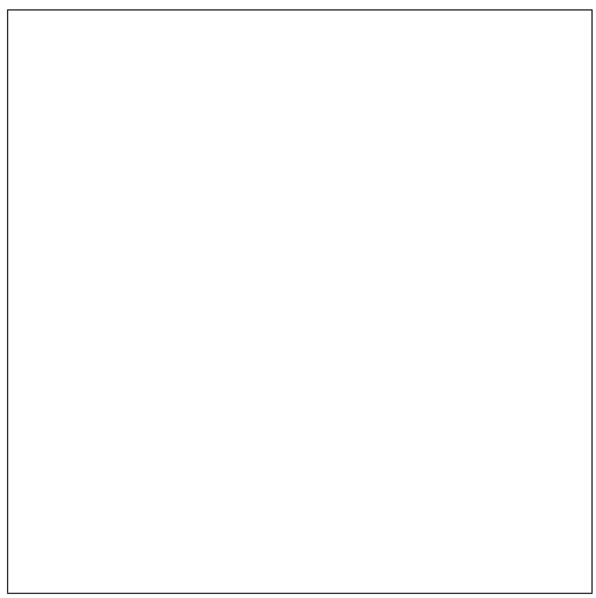

Figure 19.4: Carbon Dating Square