

6. (10 pts) An exponentially decaying substance was weighed every hour and the results recorded in one of the tables below. Unfortunately, there was a mix up with a second linear table which is also given below.

Time	Weight (in grams)	Time	Weight (in grams)
9 am	10.000	9 am	10.000
10 am	8.958	10 am	8.958
11 am	7.916	11 am	8.025
12 noon	6.874	12 noon	7.189
1 pm	5.832	1 pm	6.440

- (a) Determine which one is exponential and find a formula of the form $Q(t) = Q_0 e^{-kt}$ which would give the weight of the substance $Q(t)$ at time t in hours since 9 am.

the right column: $Q(t) = 10 \cdot (.8958)^t = 10 \cdot e^{t \ln(.8958)}$

$$= 10 e^{-.11 t}$$

- (b) Explain your reasoning in part (a).

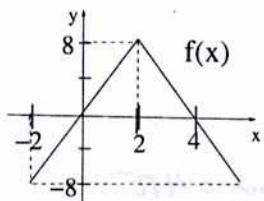
the ratios $\frac{Q(t+1)}{Q(t)}$ have to be constant for an exponential function.

- (c) How long will it be until 80% of the original amount has decayed?

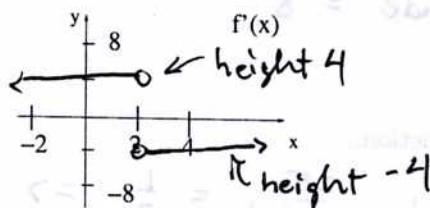
$$.8 = \frac{Q(t)}{Q(0)} = \frac{10 \cdot e^{-.11 t}}{10} \Rightarrow \ln(.8) = -.11 t$$

$$\Rightarrow t \approx 2.029 \text{ hrs. after 9 AM}$$

7. (10 pts) Sketch possible graphs of $f'(x)$ for the functions given:



(a)



(b)

