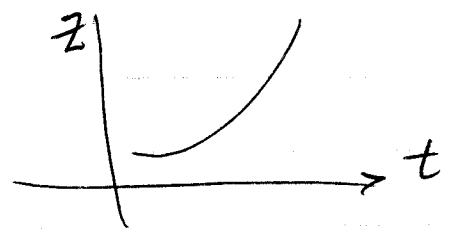
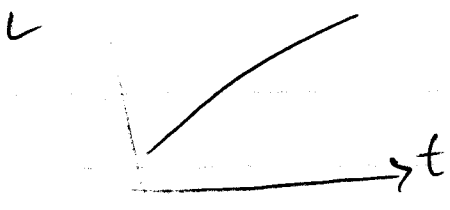


$t=0$  at 1960. Models for  $y(t)$  = ppm of  $\text{CO}_2$



a)  $L(t) = \frac{8}{7}t + 315$

b)  $Z(t) = 315(1.005)^t$



$C(t) = 4 \cos 2\pi t + 315$

2. When will  $\text{CO}_2$  level reach 550 ppm?

1. Predict  $\text{CO}_2$  level in 2100.  $t = \frac{2100 - 1960}{1} = 140$  yrs

a)  $L(140) = \frac{8}{7}(140) + 315 = \underline{\hspace{2cm}}$  ppm.

This is the amount of  $\text{CO}_2$  in 2100 if rise is LINEAR

b)  $Z(140) = 315(1.005)^{140} = \underline{\hspace{2cm}}$  ppm

This is the amount of  $\text{CO}_2$  in 2100 if rise is EXPONENTIAL

2. When will  $\text{CO}_2$  level reach  $y = 550$  ppm? Find  $t$ .

a)  $L = \frac{8}{7}t + 315$

$L - 315 = \frac{8}{7}t$

$\frac{7}{8}(L - 315) = t$

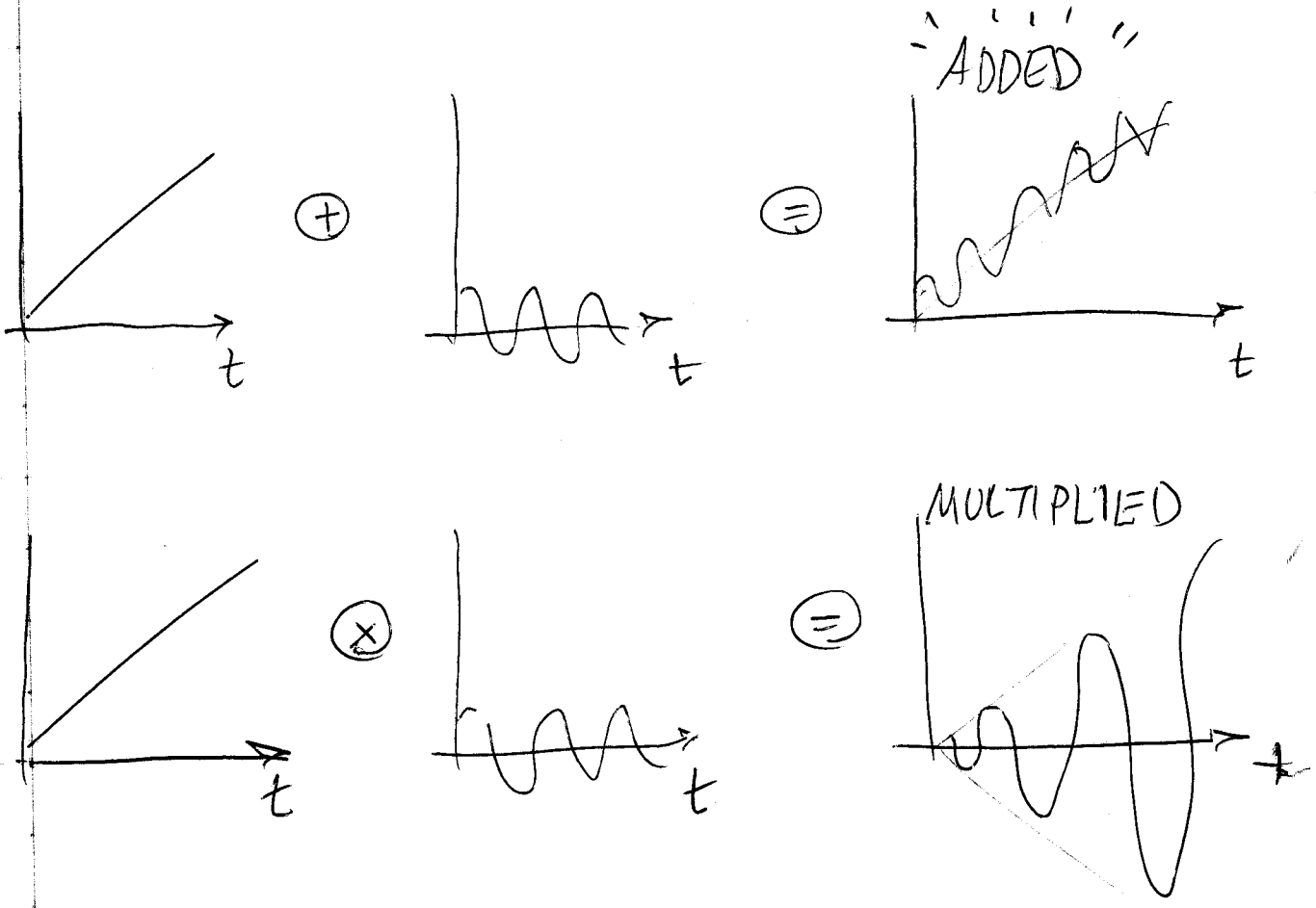
b)  $Z = 315(1.005)^t$

$\ln\left(\frac{Z}{315}\right) = \ln 1.005^t = t \ln 1.005$

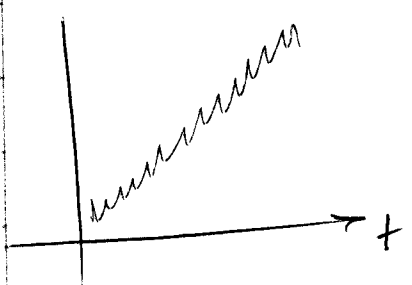
$t = \frac{\ln\left(\frac{Z}{315}\right)}{\ln 1.005}$

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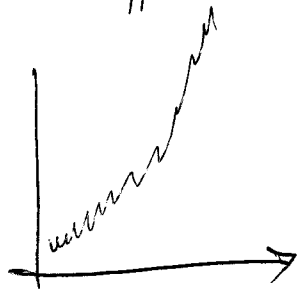
# CORRECTION - How to combine oscillations with smooth functions?



For our CO<sub>2</sub> problem,  $C(t) = 4(\text{ppm}) \cos 2\pi t (\text{yr})$



$L+C$  where  
 $L = 315 + \frac{0.7}{7}t$



$Z+C$  where  
 $Z = 315 (1.005)^t$