

- PSET #4 on APC ← new deadline
- PSET #5 due Wed <sup>Sunday nite</sup>

EC due Friday ← Test or Monday

square!  $r$  ← how linear  
not a slope!

if  $r > 0$   
slope  $> 0$

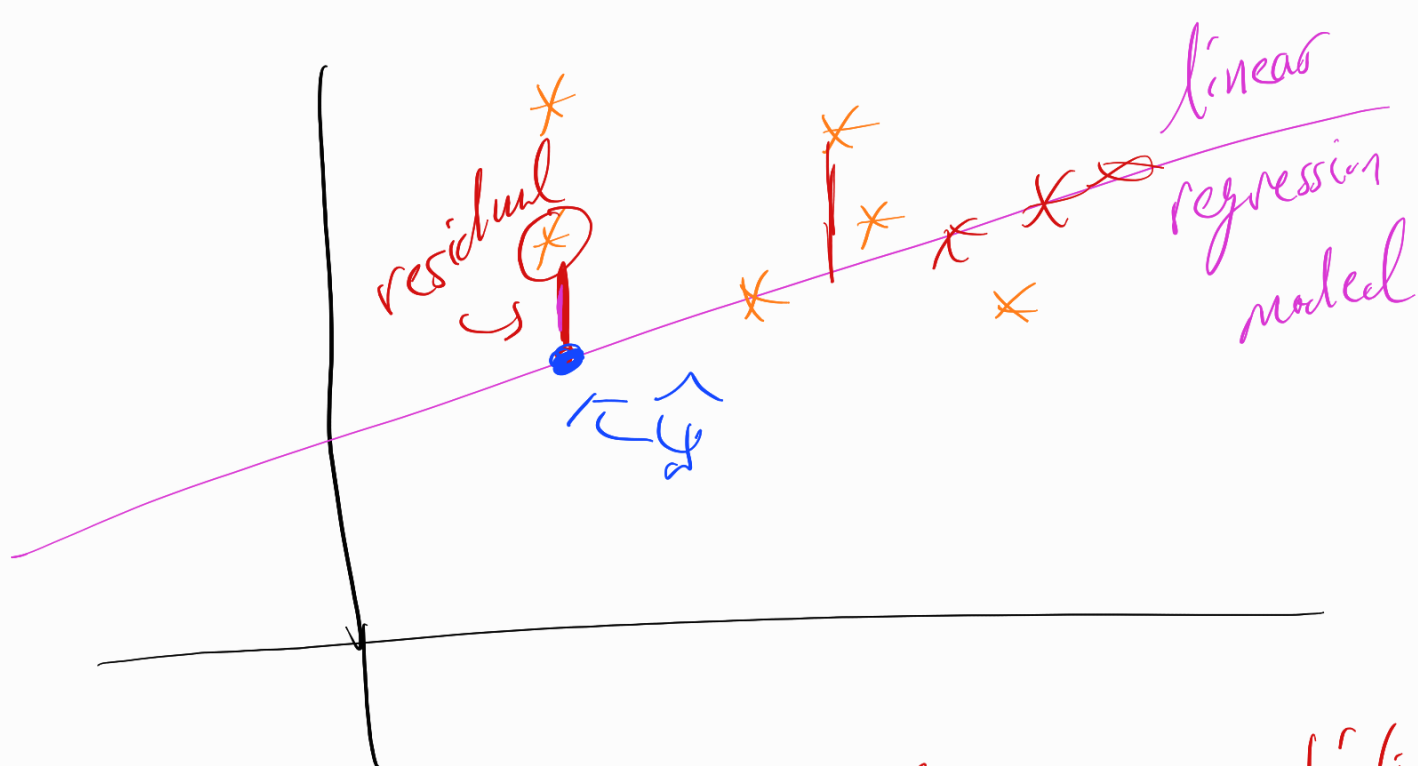
if  $r < 0 \Rightarrow$  slope  $< 0$ .

$r^2$  ← "coefficient of determination"

$$\text{slope of reg line} = \frac{r \cdot \sigma_y}{\sigma_x}$$

$$\frac{\text{cov}(X, Y)}{\text{var}(X)}$$

• % of  $\text{var}(Y)$  accounted for by  $\text{var}(X)$  in the linear regression



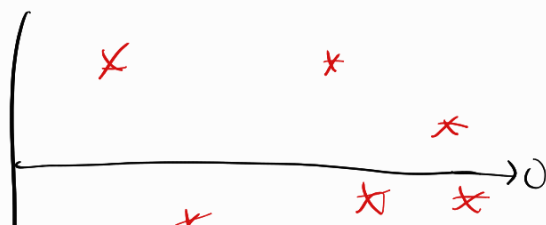
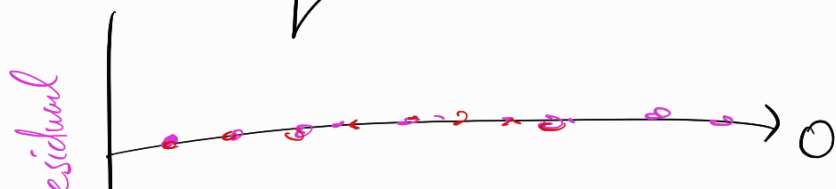
$$\text{residual} = \text{actual } y\text{-coord} - \text{prediction } y\text{-coord}$$

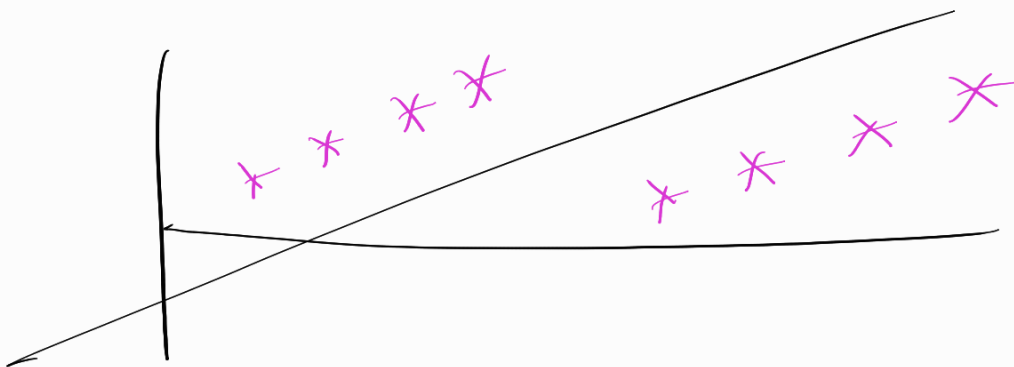
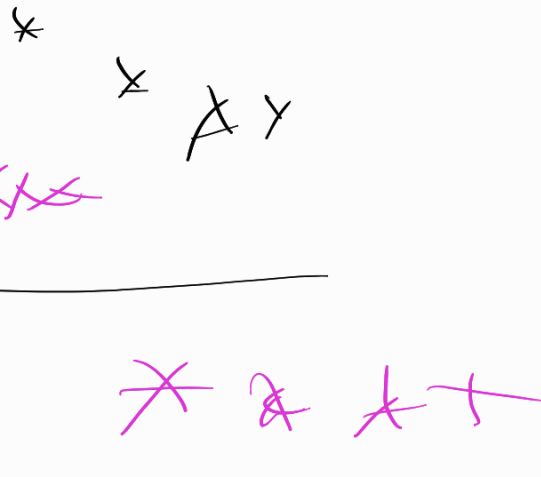
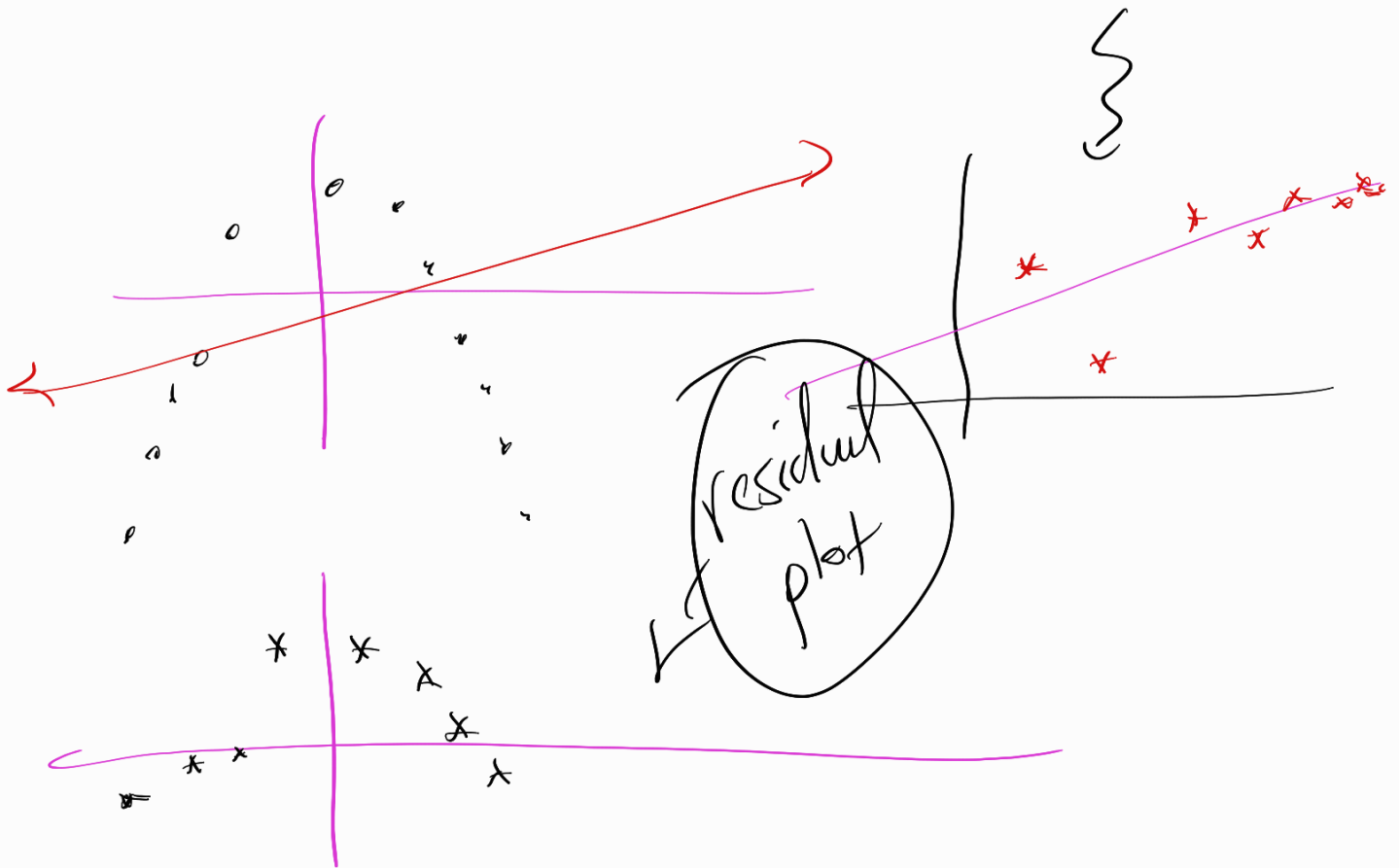
$$\text{res} = y - \hat{y} \quad \leftarrow \hat{y} = \text{prediction}$$

$\uparrow$  your data set                       $\uparrow$  from the model

residual plots

$r = +1$  or  $-1$





W. int

Predictor	Coef	SE-coef	T	P
6	3	1	0.01	

slope!

constant	2	0.08	16	0
y-variable				
units of y				
S = 2.2	R-sq = 95%	R-sq (adj) = 94%		

standard dev.

$$r^2 = 95\%$$

coeff of determination

the regression line:

$$y = 6 + 2x$$

Q1 What is the correlation

r-value

$$r^2 = \sqrt{0.95}$$

$$r = 0.974$$

Q2 if  $(x, y) = (33, 48)$

What is residual  
at  $x = 33$ ?

$$\begin{aligned}\hat{y}(33) &= 6 + 2(33) \\ &= 72\end{aligned}$$

$$125 = 48 - 72$$

$$= -24$$

Linearity a function  $f$  is linear if

$$\textcircled{1} \cdot f(x + y) = f(x) + f(y)$$

$$\textcircled{2} \cdot f(k \cdot x) = k \cdot f(x)$$

for any constant  $k$ .

Example: is  $f(x) = 2x^2$

① linear function?

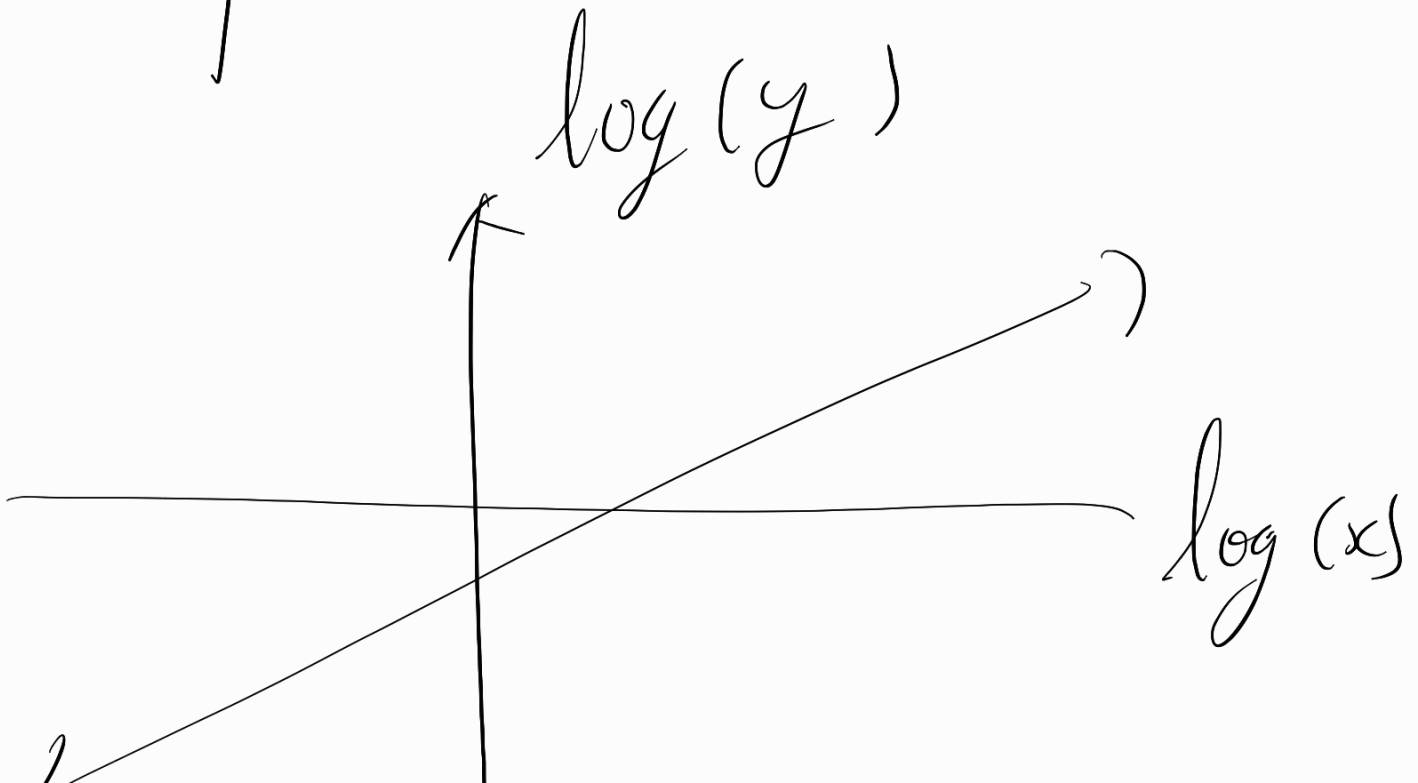
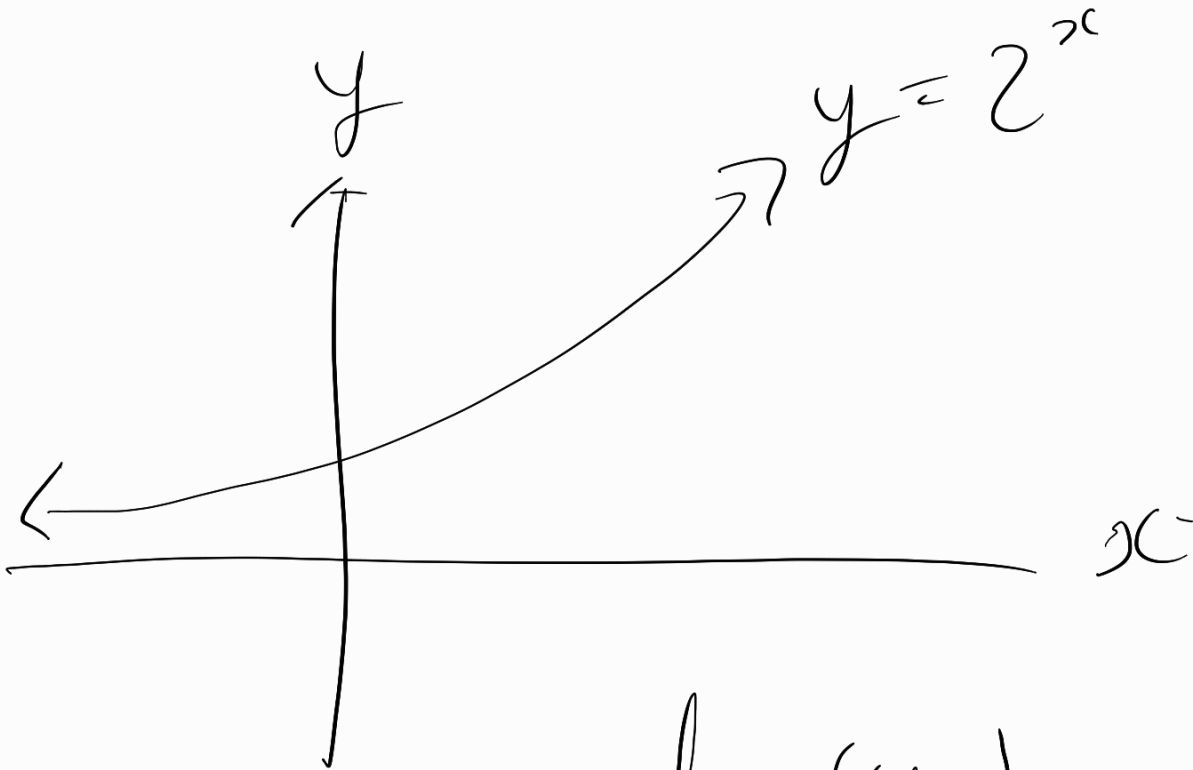
$$f(2x) \stackrel{?}{=} 2 \cdot f(x)$$

$$\hookrightarrow 2(2x)^2 \quad \downarrow \quad 2(2x^2)$$

$$18x^2$$

$$4x^2$$

not same  
 $\Rightarrow f(x)$  not linear



E

