Fall 24 problem 11

y = price (what you're predicting)

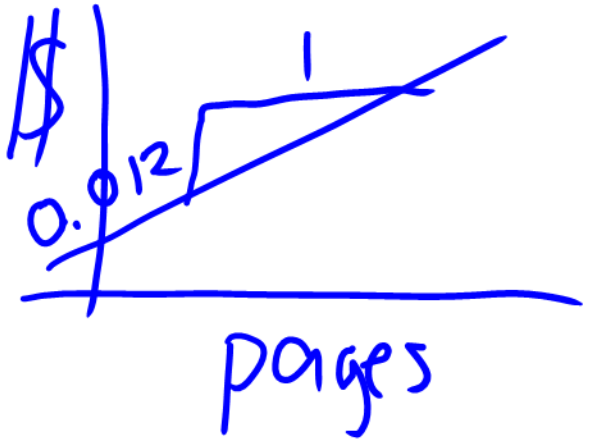
x = pages (what prediction is based on)

$r = 0.6$

mean $y = 15$ $SD_y = 4$

mean $x = 500$ $SD_x = 200$

$$m = \frac{r * SD_y}{SD_x} = \frac{0.6 * 4}{200} = \frac{2.4}{200}$$



$$= \frac{1.2}{100} = 0.012$$

$b = \text{mean } y - m * \text{mean } x$

$15 - \frac{12}{\cancel{1000}} \times \cancel{500}_{2}$

$15 - \frac{12}{2} = \boxed{9}$

predictions:

$y = 0.012x + 9$

11.2

martian has 30 extra pages

0.012 dollars per page

$\Rightarrow 30 * 0.012 = 3 * 0.12$

$= \boxed{0.36}$

$$y_{martian} = 0.012 x_{martian} + 9$$

$$-\left(y_{wild} = 0.012 x_{wild} + 9\right)$$

$$y_{martian} - y_{wild} = 0.012 x_{martian} - 0.012 x_{wild}$$

$$= 0.012 \underbrace{\left(x_{martian} - x_{wild}\right)}$$

$$= 0.012 * 30$$

$$= 0.36$$

11.3

plug in $x = 700$

$$y = 0.012 * 700 + 9$$

$$= \frac{12}{\cancel{1000}} * \cancel{700} + 9$$

$$\frac{12}{10} * 7 + 9$$

$$\frac{6}{5} * 7 + 9$$

$$\frac{42}{5} + 9$$

$$\frac{84}{10} + 9$$

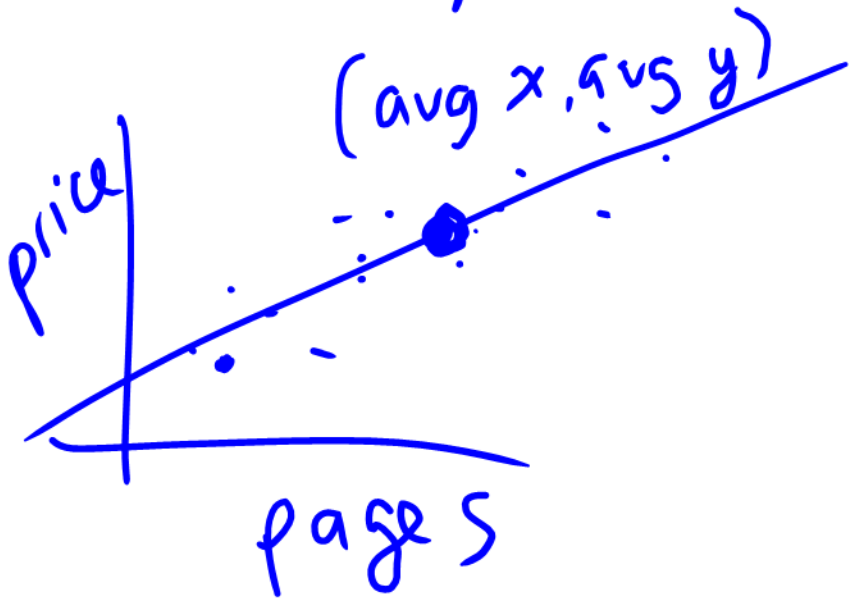
$$8.4 + 9$$

$$\boxed{\$ 17.40}$$

11.4

price $-12 \Rightarrow 12$

changing one point on scatterplot (moving up)



where can dot be so that moving it up makes slope less steep?

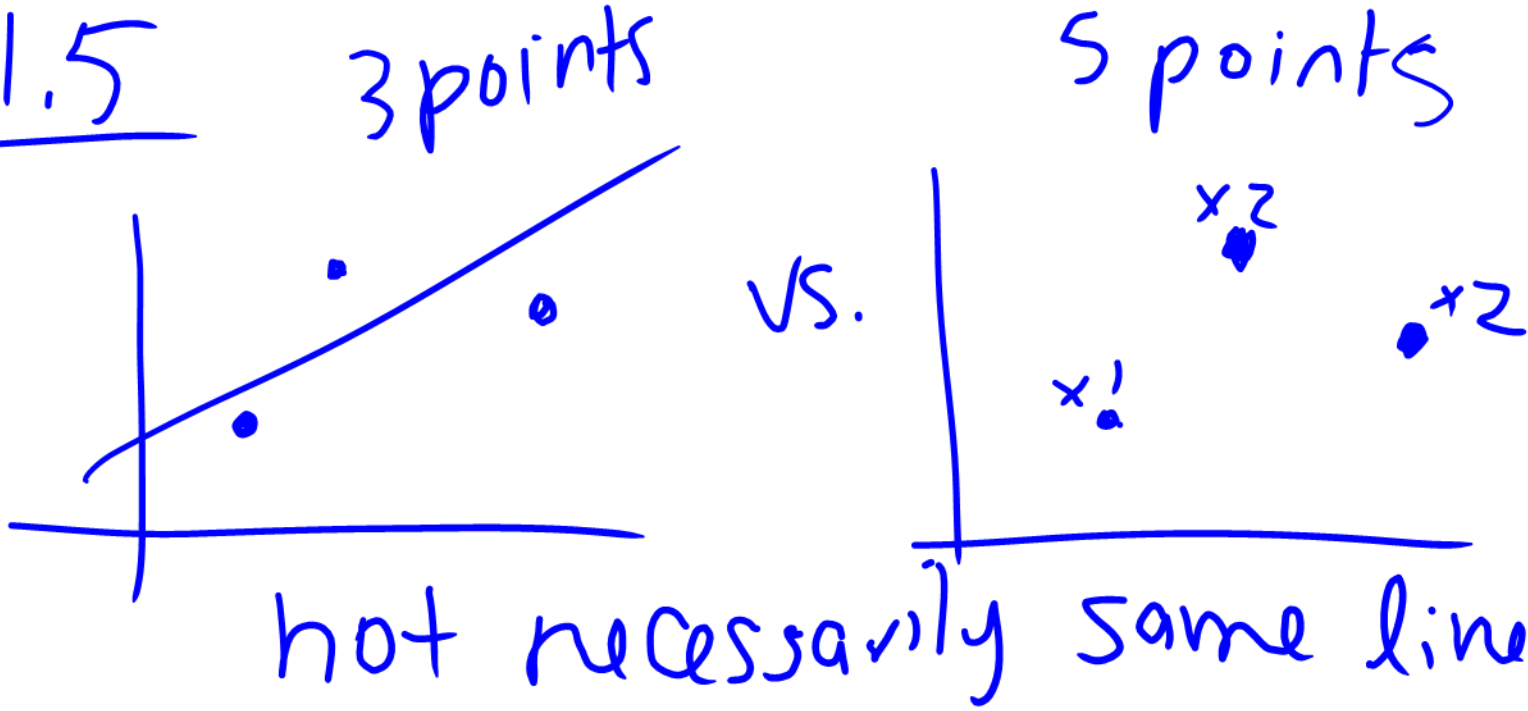
another approach

$y = 0.012x + 9$

$12 = 0.012x + 9$

solve for $x \approx 300$ pages

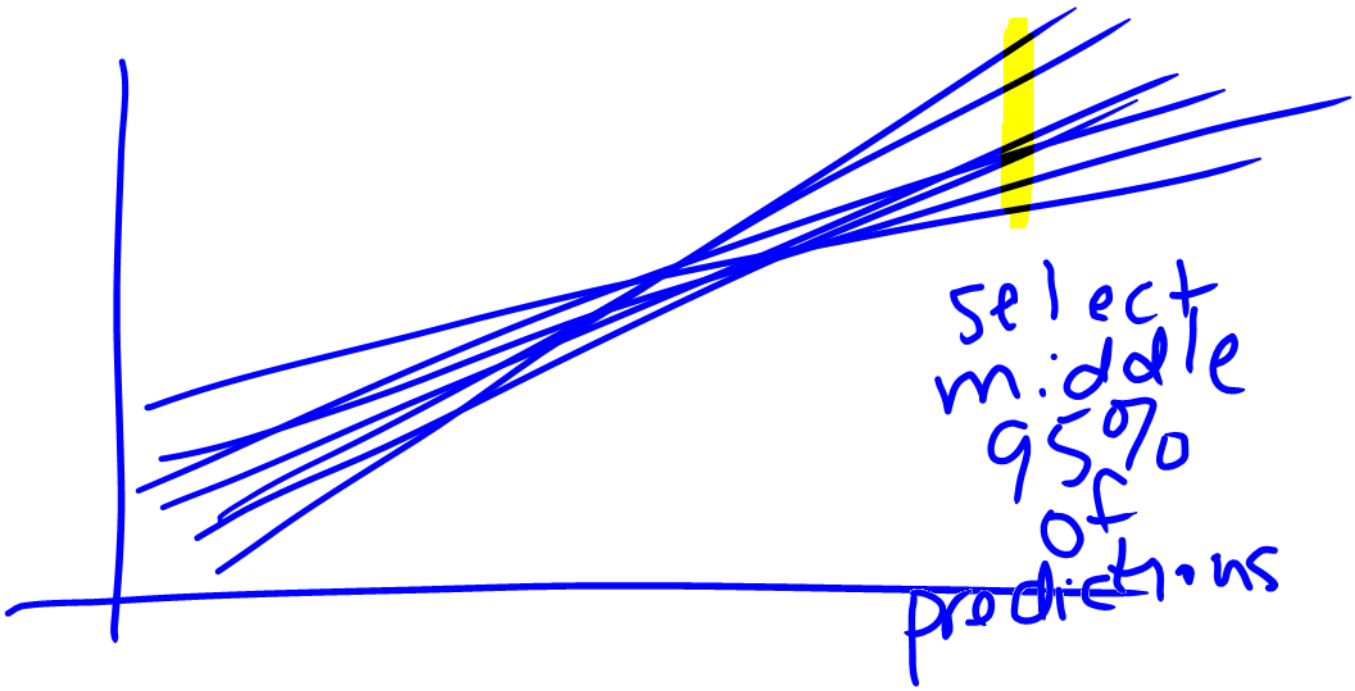
11.5



not necessarily same line

11.6

by bootstrapping, create lots of regression lines



regression formulas in standard units

$$y_{su} = r * x_{su}$$

su = # SDs above avg

Fall 22 Final Problem C

6.1

y = age x = income

$$y_{su} = r * x_{su}$$

$$\frac{4}{5} = r * \frac{8}{3}$$

$$r = \frac{3}{10}$$

6.2

y = income x = age

$$y_{su} = r x_{su}$$

$$S = \frac{3}{\cancel{10}\,5} * \frac{\cancel{4}}{5}\,2$$

$$= \frac{6}{25}$$

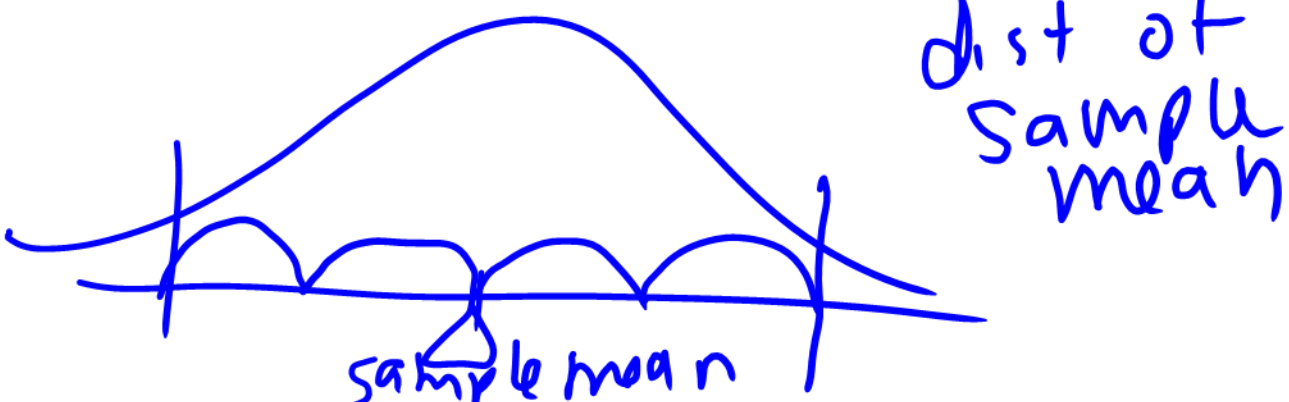
Fall 22 Q10

hundred_apps = sample

apps = pop

sample mean = 35

sample SD = 10



$$\left(\begin{array}{l}\text{one jump} \\ \text{(one SD of} \\ \text{dist of sample} \\ \text{mean)}\end{array}\right) = \frac{\text{sample's SD}}{\sqrt{\text{sample's size}}}$$

$$= \frac{10}{\sqrt{100}}$$

$$= 1$$

$$\Rightarrow [33, 37]$$