8:05am

Day 1 of x days

Dec 2nd, 2022

INTRO TO STAT 101 - SEBASTIAN THRON & ADAM SHERSIN

**TEASER**

Two types of people

Type A ~ 80 friends ½

Type B - 20 friends ½

Quiz

What are the chances you picked a

type A friend : $\frac{80}{100} = 0.8$

type B friend : $\frac{20}{100} = 0.2$

$\Sigma = 1.0$

In expectation how many friends do you have

$$E(y|A) + E(y|B)$$

$$0.8 \times 80 + 0.2 \cdot 20$$

$$64 + 4 = 68 \text{ friends}$$

Teaser video ↔ Proof that you are unpopular

(i) Average no of friends

(ii) Ex

# CONCEPTS

## STATS DATA TO DECISIONS

① Allows one to make decisions based on data obtained

① Decisions are made based by data

Problem: You want to buy a house costing $92,000. Is this amount too much or too little. Let's look @ the data.

| Size ($ft^2$) | Cost ($) |
|---|---|
| 1400 | 112,000 |
| 2400 | 192,000 |
| 1800 | 144,000 |
| 1900 | 152,000 |
| 1300 | 104,000 |
| 1100 | 86,000 |

→ The bigger the house, the $ the cost

# Quiz 1

(i) The house you want is $1300 ft^2$. How much are you expected to pay?

104,000 ✓

(ii) The area is $1500 ft^2$. How much are you expected to pay?

$$1900 = 152,000$$
$$1500 = x$$
$$1300 = 104,000$$

$$\frac{1900 - 1300}{1500 - 1300} = \frac{152,000 - 104,000}{x - 104,000}$$

$$\frac{3 \cancel{600}}{\cancel{200}} = \frac{48}{x - 104,000}$$

$$3(x - 104,000) = 48$$
$$3x - 312 = 48$$
$$x = \frac{48 + 312}{3}$$

$x = 120,000$

For $1500\ ft^2$, I am expected to pay $120,000\$$

For $1800\ ft^2$, expected to pay $144,000\$$

For $2100\ ft^2$

$2400\ ft^2 = 192,000$

$2100\ ft^2 = x$

$1800 = 144,000$

$$\frac{2400 - 1800}{2100 - 1800} = \frac{192,000 - 144,000}{x - 144,000}$$

$$\frac{600}{300} = \frac{48,000}{x - 144,000}$$

$2x - 288,000 = 48,000$

$2x = 336,000$

$x = 168,000$

For $2100 ft^2$, you are expected to pay 161,000$

Another way to answer, $2100 ft^2$ is halfway of $2,400 ft^2$ and $1800 ft^2$, meaning it's price will be the average of both prices

$$\frac{192 + 144}{2} = 1000 \cdot$$

168,000$

What is the cost of home per sq ft?

If $1400 ft^2 : 112,000$

Then $1 = x$

$$\frac{112,000}{1400} =$$

$$x = 80\$$$

# Unit 2

| Size | Price | Price/sqft $ |
|---|---|---|
| 1400 | 98 000 | 70 |
| 2400 | 168 000 | 70 |
| 1800 | 126 000 | 70 |
| 1900 | 133 000 | 70 |
| 1400 | 91 000 | 65 |
| 1100 | 77,000 | 70 |

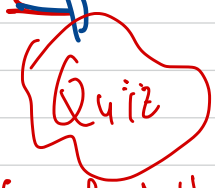
Quiz :- Is there a fixed dollar amount per square feet ?

○ Yes ⊗ NO

- A quick look @ the data shows 2 houses of the same size with diff. prices.
  - I didn't need to work it out if I had just looked @ the data

Now for

1300 $ft^2$ → 91,000



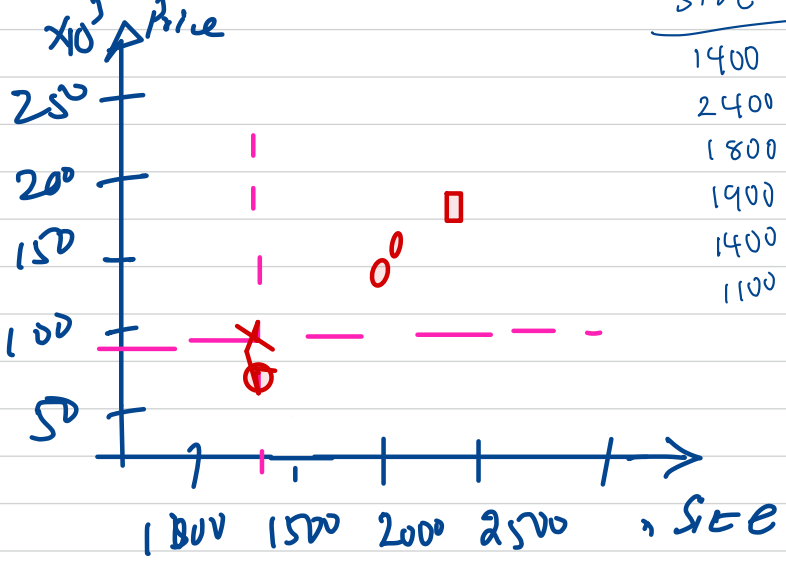

→ Is there a fixed dollar amount per square foot?

☑ Yes ☐ No

2:36 pm

# Ways to visualize data

→ Scatter plots : Each data point is a point




| Size | Price |
|---|---|
| 1400 | 98 000 |
| 2400 | 168 000 |
| 1800 | 126 000 |
| 1900 | 133 000 |
| 1400 | 91 000 |
| 1100 | 77,000 |

Draw your own scatter plot

| Size | Price |
|---|---|
| 1700 | 51000 |
| 2100 | 63000 |
| 1900 | 57000 |
| 1300 | 39000 |
| 1600 | 48000 |
| 2200 | 66000 |


Is the relationship linear? Yes

Do we believe there's a fixed price per square foot?

Yes 30$/ ft²

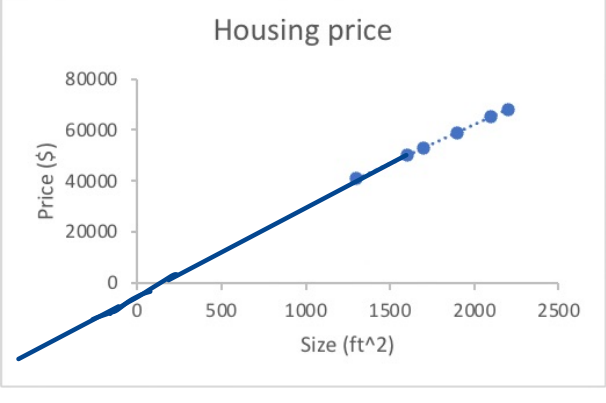
# Exercise 2

Make your own scatter plot

| Size | Price | price per ft2 |
|---|---|---|
| 1700 | 53000 | 31.1765 |
| 2100 | 65000 | 30.9524 |
| 1900 | 59000 | 31.0526 |
| 1300 | 41000 | 31.5385 |
| 1600 | 50000 | 31.25 |
| 2200 | 68000 | 30.9091 |

Are the prices per ft² the same?

No




Is the relationship linear?

Yes.

Even though the price per ft², the relationship is linear

Price = [30] $/ft² · size + [ ] $

y : m × + c

m : gradient or slope

c : intercept

Gradient = $\frac{\Delta y}{\Delta x} = \frac{(65 - 53) \cdot 100}{(21 - 17) \cdot 100}$

$= \frac{12}{4} \cdot 100 = 3 \cdot 100 = 300$

To find intercept, let's use

1,700 size → 53,000$

2,100 size → 65,000

$53,000 = 30 \times 1,700 + x$

$53,000 - 51,000 = x$

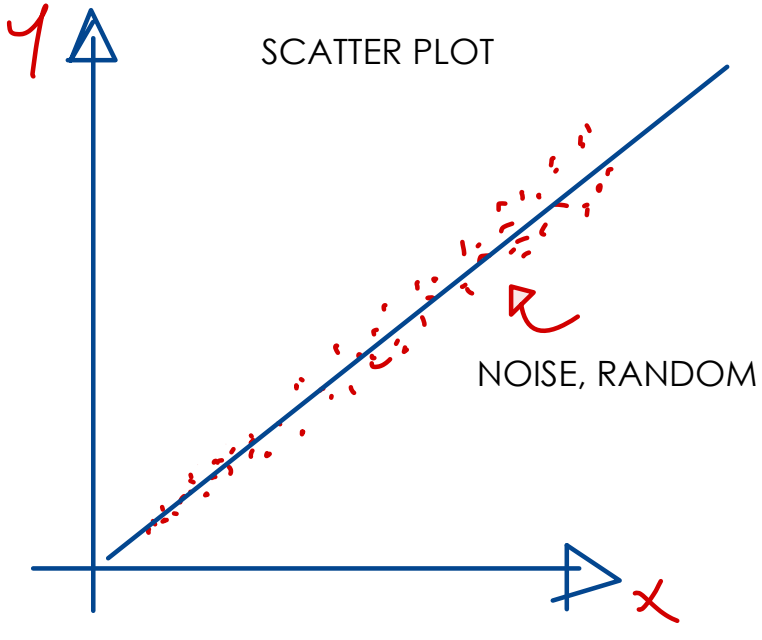
$2,000 = x$

PRICE = $30 \frac{\$}{ft^2} \cdot size + 2000\$$

Is there a line that exactly matches the trend of the data

No

| Size | Price |
|---|---|
| 1700 | 53000 |
| 2100 | 44000 |
| 1900 | 59000 |
| 1300 | 82000 |
| 1600 | 50000 |
| 2200 | 68000 |


y
SCATTER PLOT
NOISE, RANDOM
x