

Statistics, lecture 16 : اللقاة المباشرة 11

mean :- measure of location

كـ يعني قيمته بتلعب موقعه بالتالي كل ما كانت الرسمة عاليه من أكثر ، بتزيد قيمته



σ : Measure of variation

بشوف تقارب او تباعد البيانات عن وسطها .



See example 1 + Try it Yourself 1, book P 257. 11

See example 2, book, P 258.

e.g) If $X \sim N(10, \sigma^2)$ and $Q_1 = 7$, then find IQR

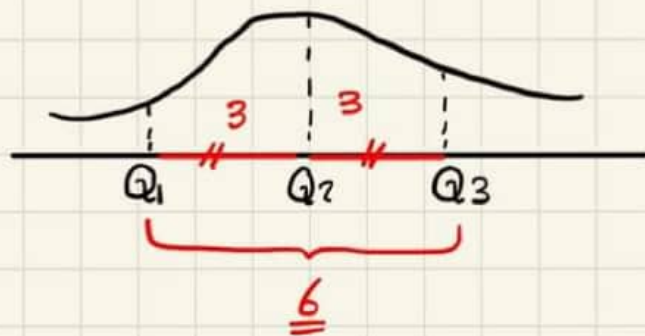
Sol) $IQR = Q_3 - Q_1 \Rightarrow 6$

$Q_3 - Q_2 = Q_2 - Q_1$

$Q_3 - 10 = 10 - 7$

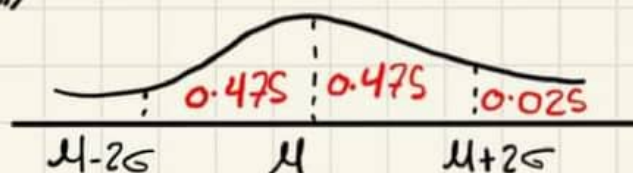
$Q_3 = 13$

or



e.g) If $X \sim N(\mu, \sigma^2)$ and $P(X > \mu + 2\sigma) = 0.025$, find $P(X > \mu - 2\sigma)$

Sol)



$P(X > \mu - 2\sigma) = 0.975$

* $P(Z < -3.5) = \text{zero}$

لا ده ما يع اسني كتبت -3.49

* $P(Z > 3.6) = \text{zero}$

لا ده ما يع اسني فونه 3.49

* $P(Z < 3.6) = 1$

* Solve example 3, book, p260

Commulative area = المساحة يار الرقم " من اقول "

* Solve example 1, book, P268.

* " " 2, book, P269.

* " " 4, " , P277

* " " 1, " , P298

* " " 3, " , P301

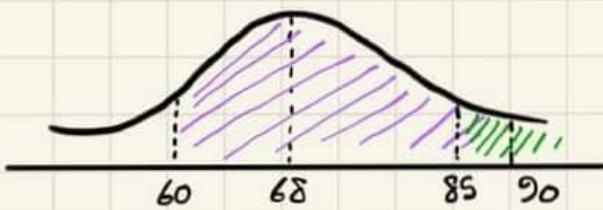
* " " 4, " , P302.

عامة 21 يوتوب في هنا

eg) Suppose that the grades in a general examination are normally distributed with mean 68 and standard deviation equal to 10:

- Find the proportion of grades that are more than 85
- The proportion of grades that are between 60 and 90.
- The 95th percentile.

Sol)



- $1 - P(X \leq 85) = 1 - P(Z \leq 1.7) = 0.0446$
- $P(X \leq 90) - P(X \leq 60) = P(Z \leq 2.2) - P(Z \leq -0.8) = 0.9861 - 0.2119 = 0.7742$

- $P_{95} = \dots$
 $P(X < P_{95}) = 0.95 = P(Z < \frac{P_{95} - 68}{10}) = 0.95$
 $\frac{P_{95} - 68}{10} = 1.64 \Rightarrow P_{95} = 84.4$

eg) If the heights of students are normally distributed with mean 170 cm and standard deviation 10 cm.

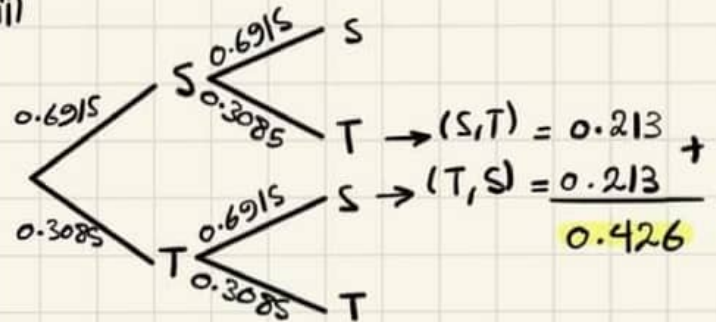
- A student is selected at random, what is the Prob that the student is shorter than 175 cm?
- 2 students are selected at random, what is the Prob that exactly 1 of them is shorter than 175 cm.

iii) 10 students are selected one by one with replacement, what is the Prob that exactly 4 of them are shorter than 175 cm.

Sol) $X \sim N(170, 100)$

$$i) P(X < 175) = P(Z < 0.5) = 0.6915$$

ii)



- Y : no. of students shorter than 175 cm
 $Y \sim \text{Bin}(10, 0.6915)$
 $P(Y=4) = \binom{10}{4} (0.6915)^4 (0.3085)^6 = 0.041$

eg) If $X \sim N(50, 4)$, find:

- Mean
- Mode
- Median
- the IQR
- the 85th percentile
- the standard deviation and variance

Sol) i) $\mu = 50$ ii) mode = 50 iii) $Q_2 = 50$
 iv)



$$P(X < P_{25}) = 0.25 \Rightarrow P(Z < \frac{P_{25} - 50}{2}) = 0.25$$

$$\frac{P_{25} - 50}{2} = -0.67 \Rightarrow P_{25} = 48.7$$

$$P_{75} = 51.3$$

$$\text{IQR} = 2.6$$

$$i) P(X < P_{85}) = 0.85$$

$$P\left(z < \frac{P_{85} - 50}{2}\right) = 0.85 \Rightarrow \frac{P_{85} - 50}{2} = 1.04$$

$$P_{85} = 52.08 \approx 52.1$$

$$ii) \sigma = 2, \sigma^2 = 4$$