Standard Deviation

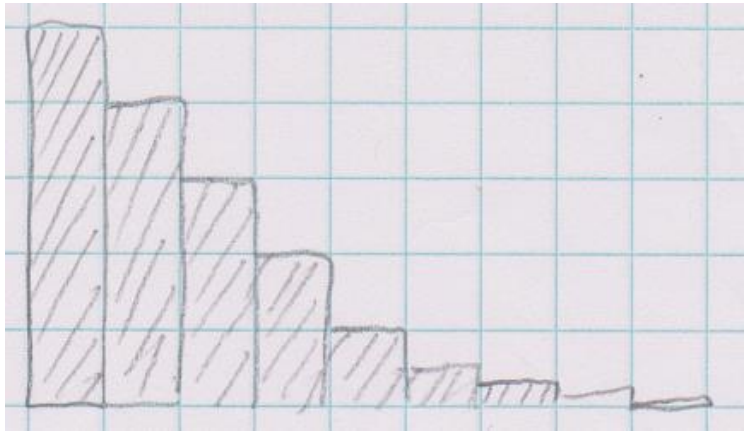
Measure of Spread

Which graph matches each description?

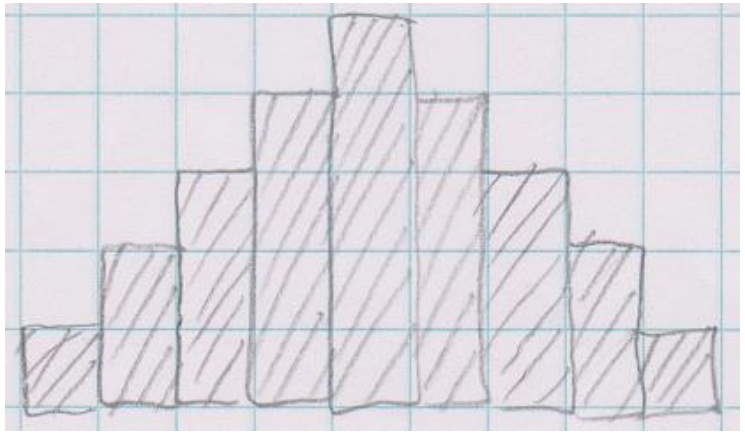
(i) mound shaped (ii) bell-curve (iii) left skew

(iv) bi-modal (v) right skew (vi) u-shaped

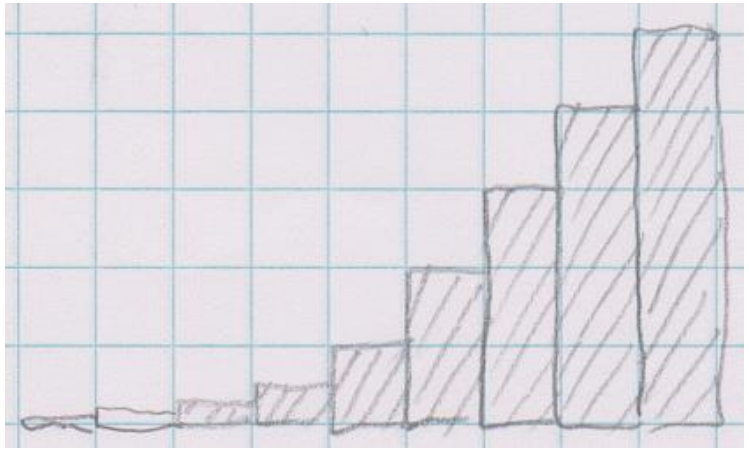
A



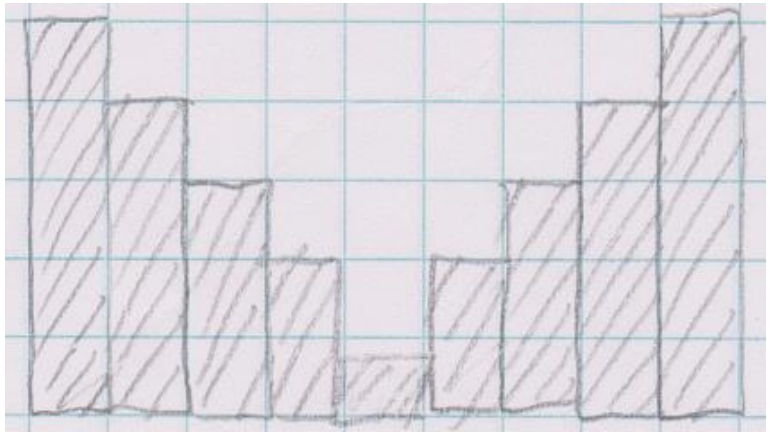
C



B

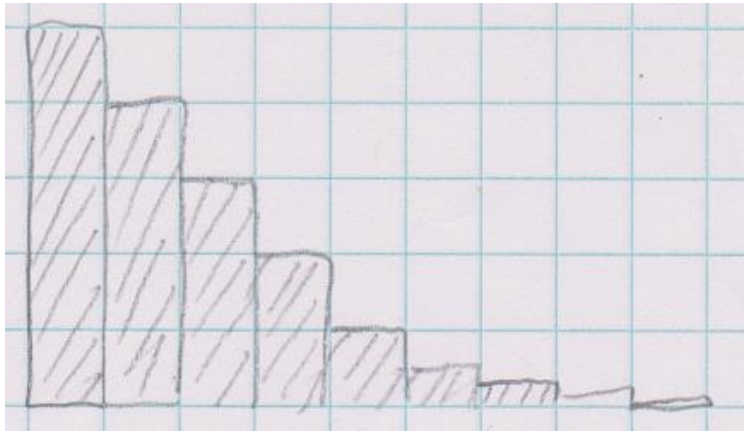


D

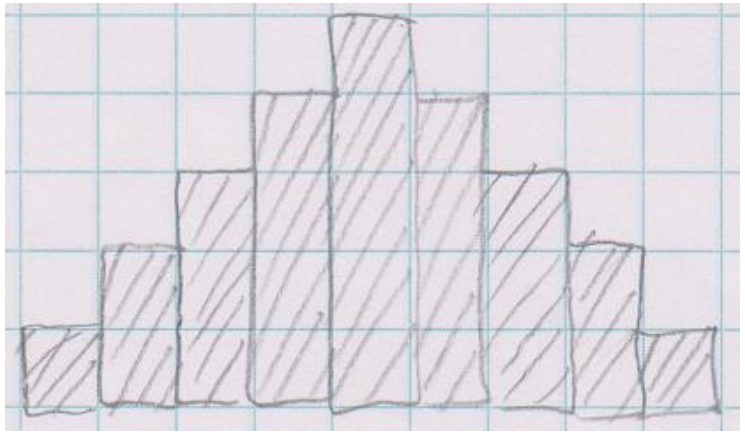


Which graph could have:
A mean of 16, a median of 16 and modes of 2 and 22?

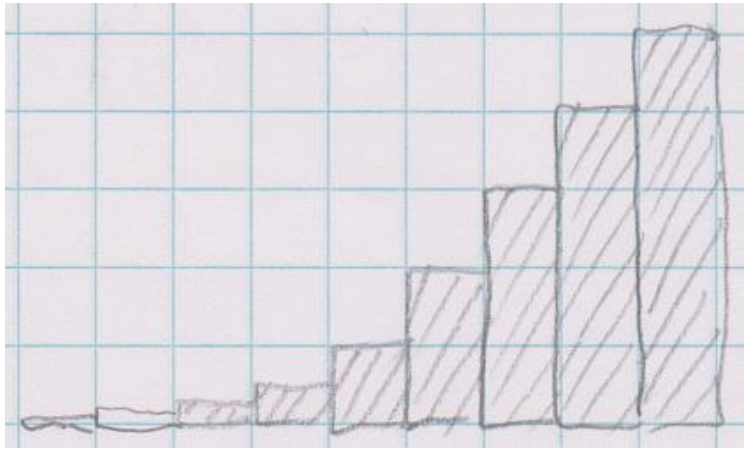
A



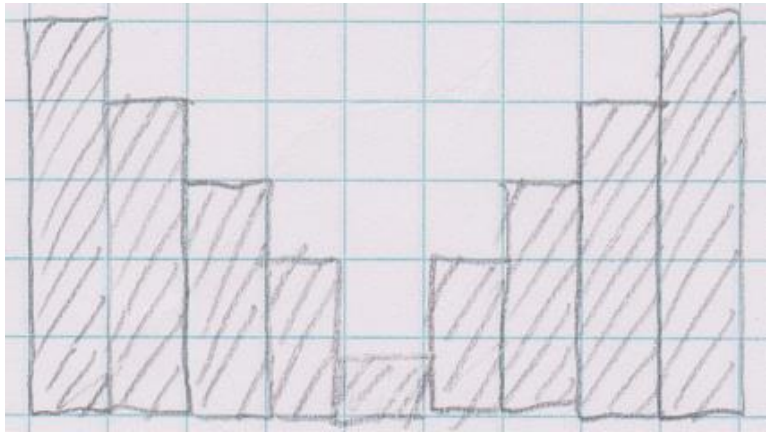
C



B

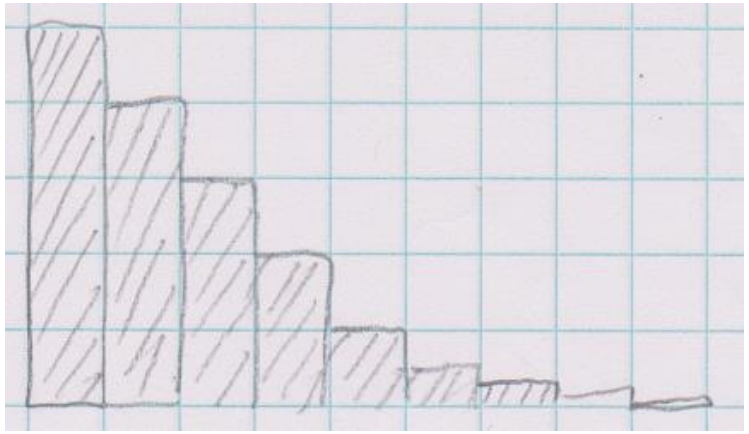


D

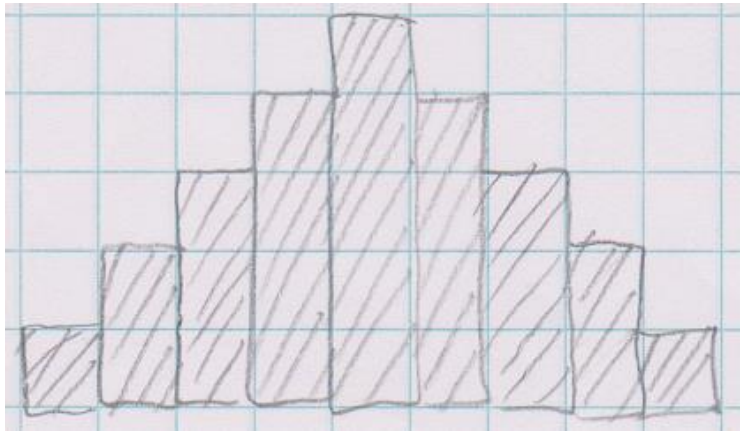


Which graph could have:
A mode of 4, median of 8 and a mean of 12?

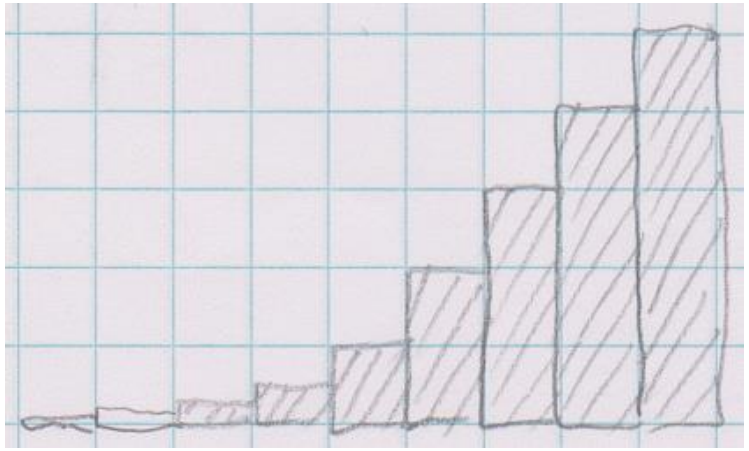
A



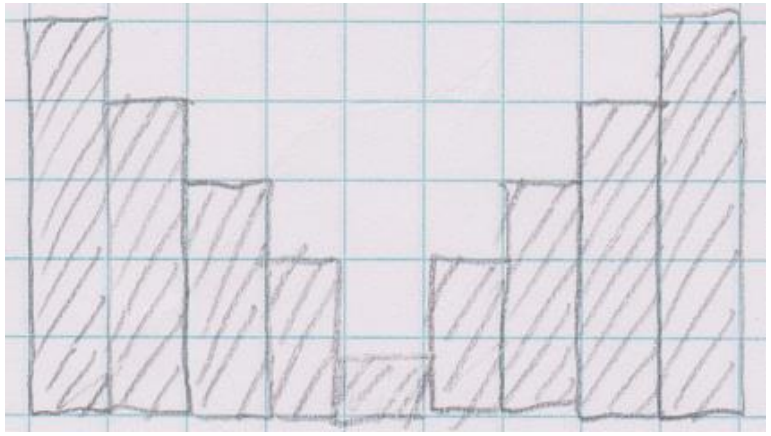
C



B

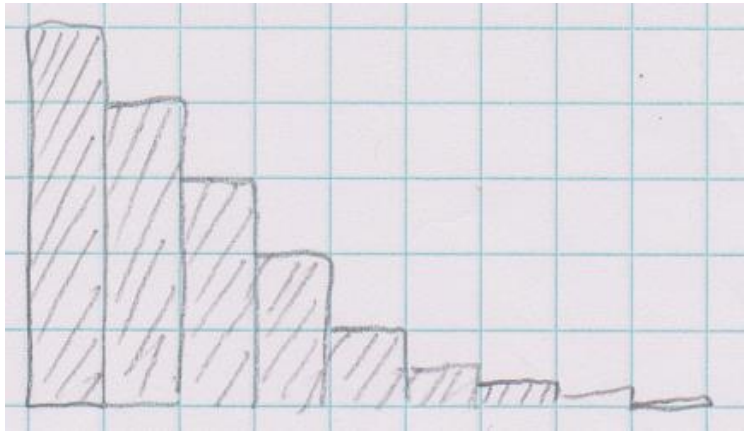


D

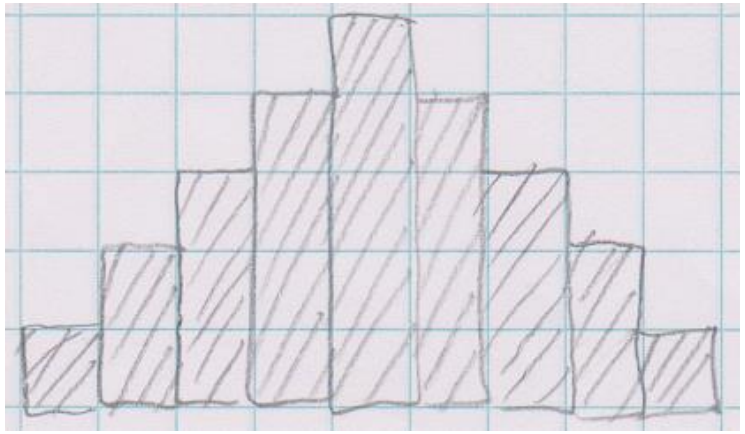


Which graph could have:
A mode of 34, median of 34 and a mean of 34?

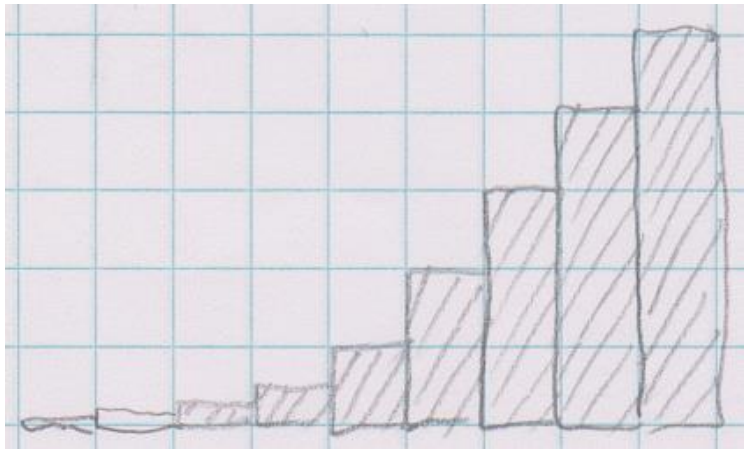
A



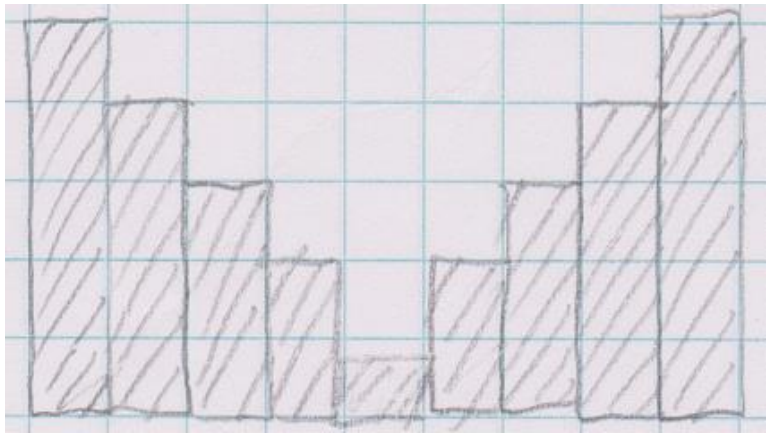
C

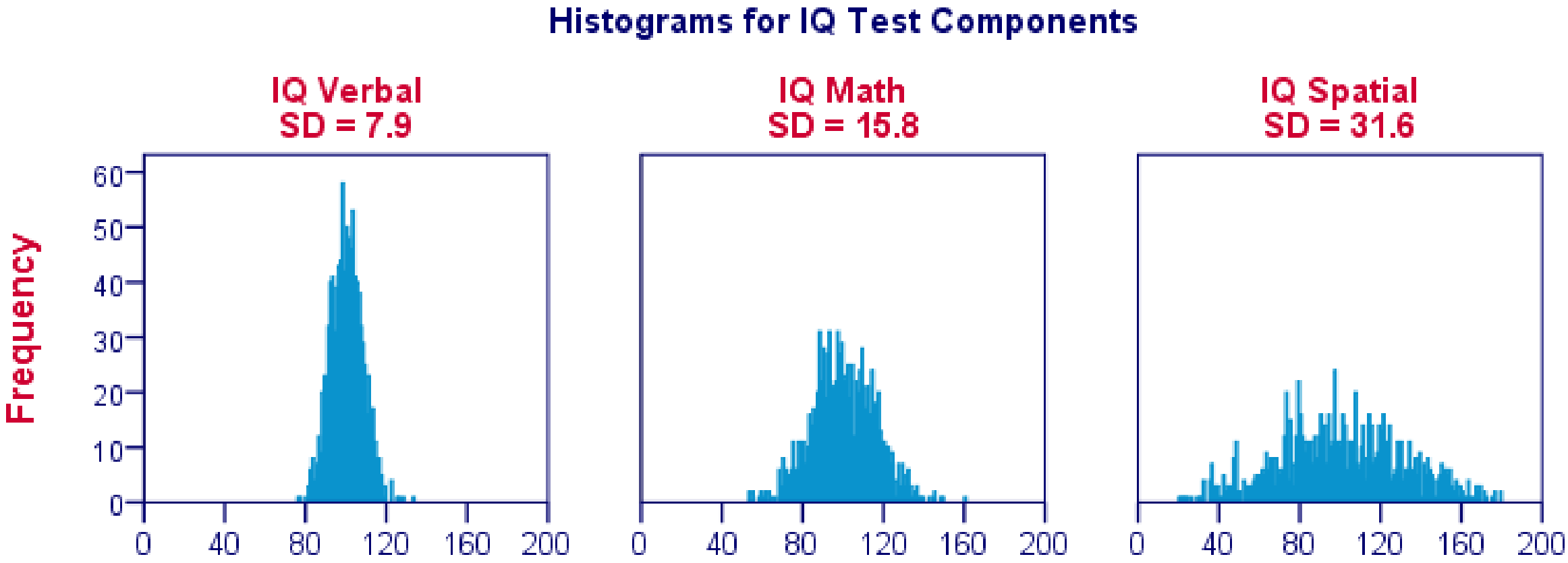


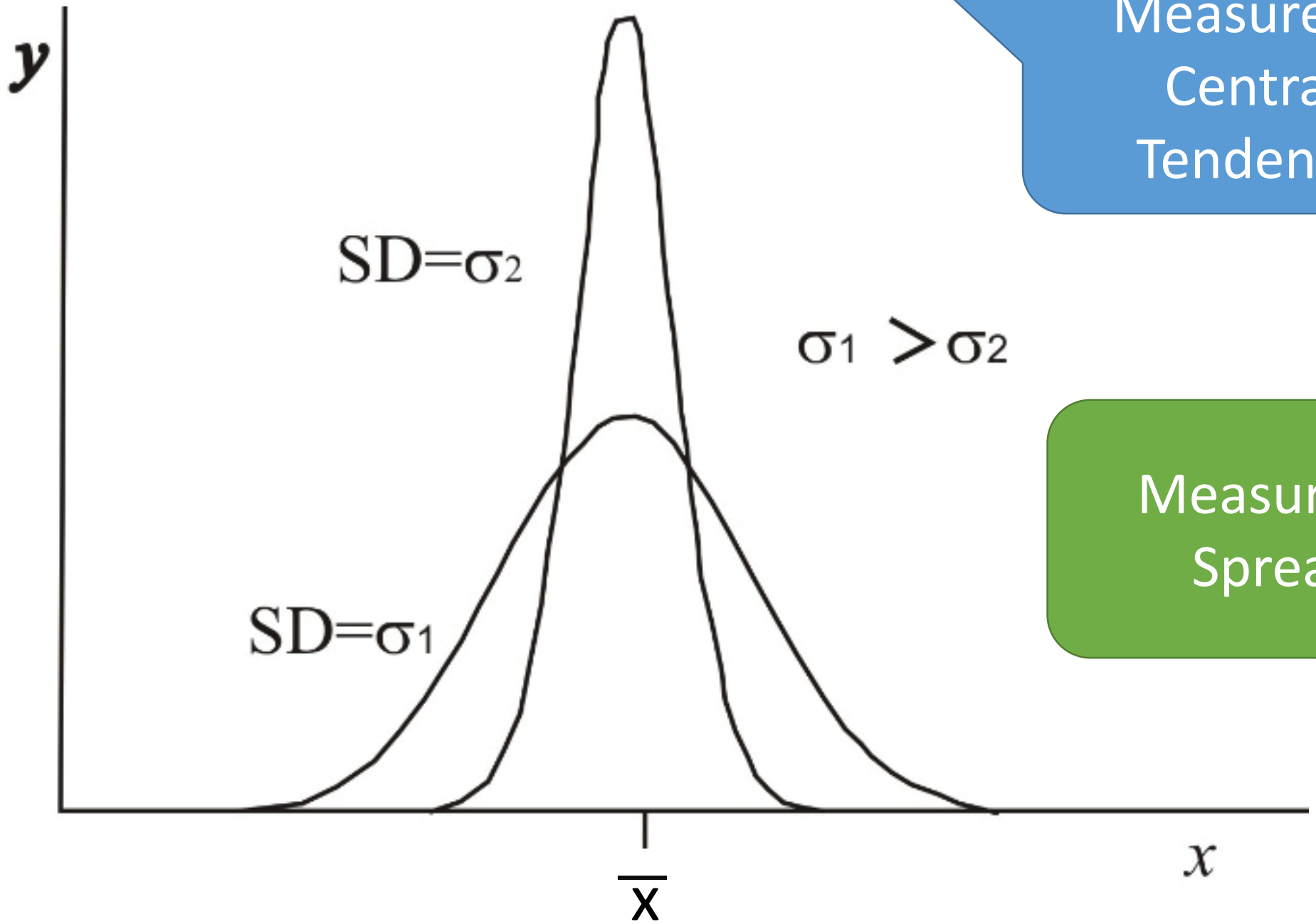
B



D




Histograms for IQ Test Components
IQ Verbal
SD = 7.9
IQ Math
SD = 15.8
IQ Spatial
SD = 31.6
Frequency
60
50
40
30
20
10
0
0
40
80
120
160
200



Measure of Central Tendency

Measure of Spread

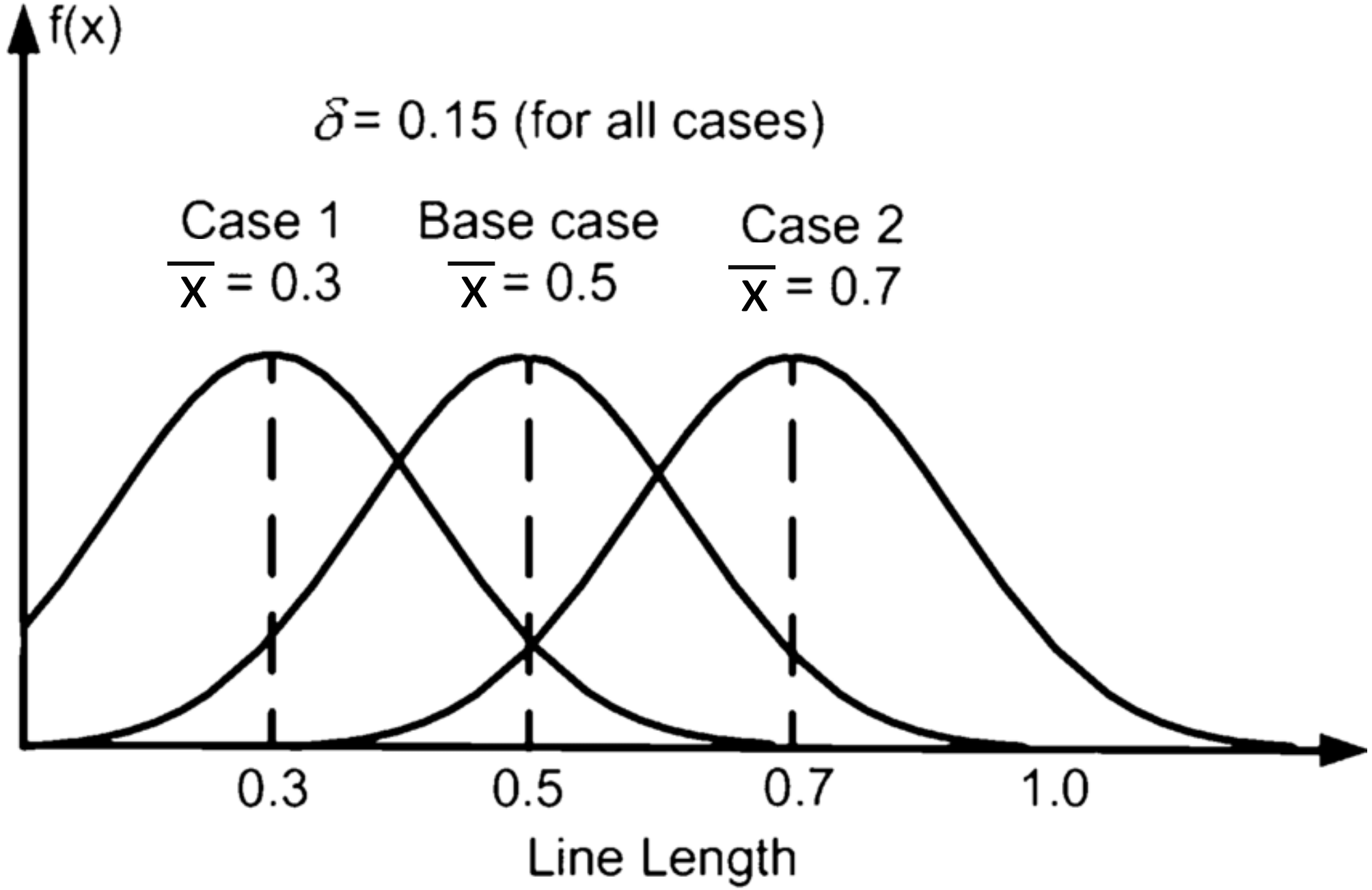
Measure of Spread

How consistent is the data?

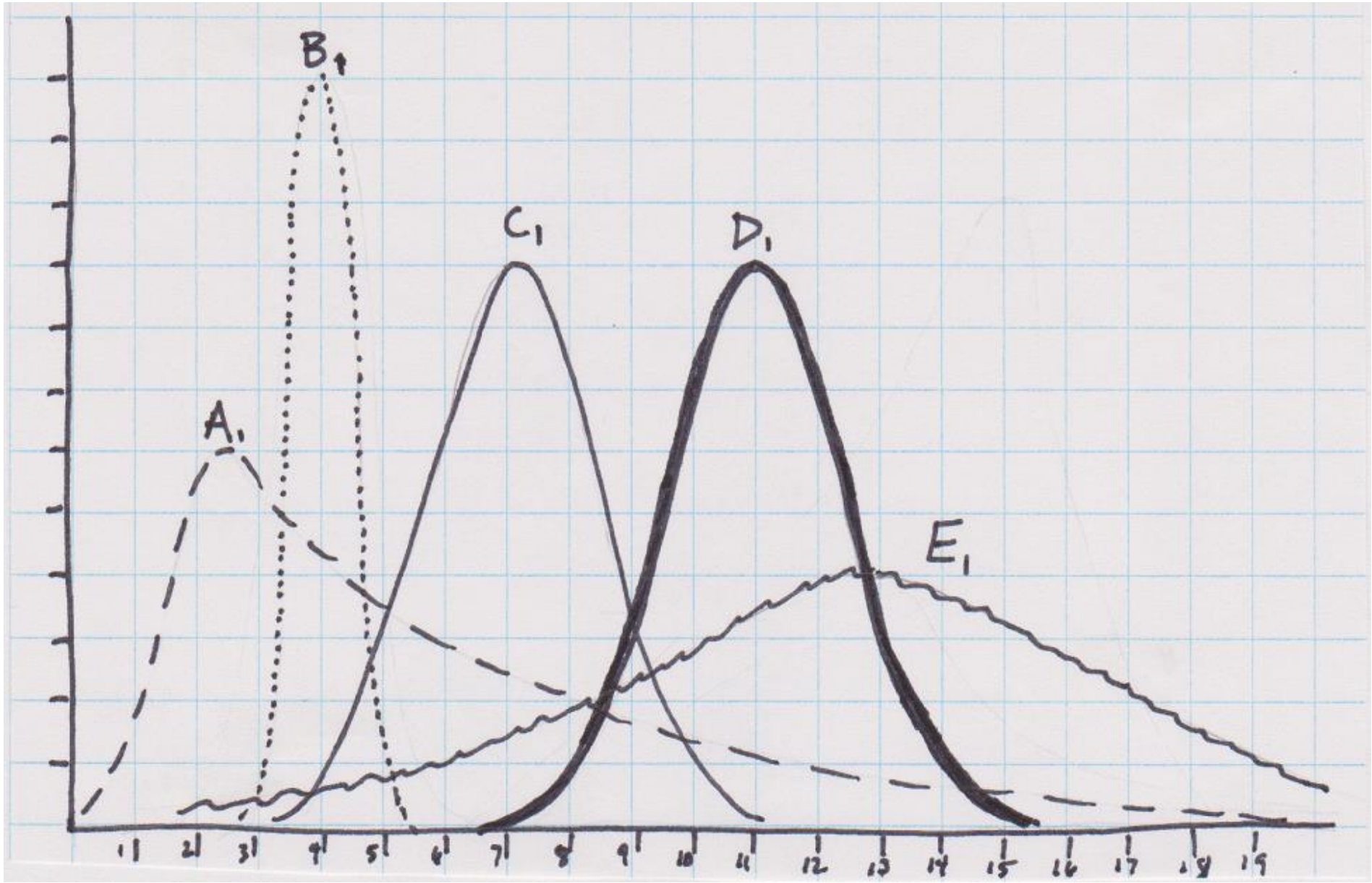
How tightly is the data grouped around the mean?

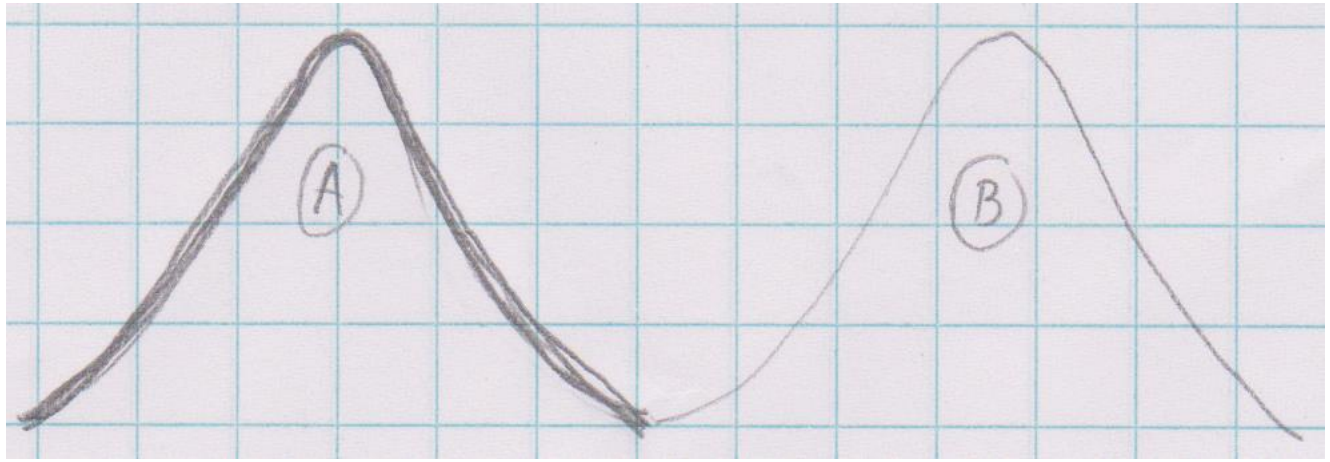
How similar is the data?

How much spread is in the data?

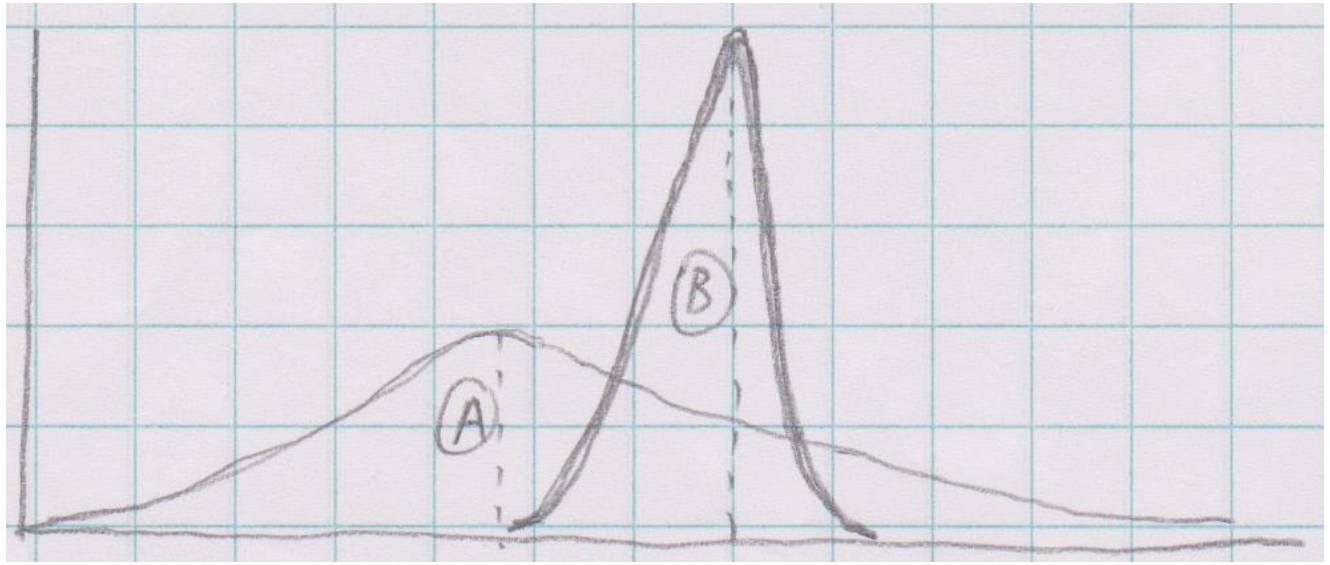

f(x)
δ = 0.15 (for all cases)
Case 1
$\overline{x}$ = 0.3
Base case
$\overline{x}$ = 0.5
Case 2
$\overline{x}$ = 0.7
0.3
0.5
0.7
1.0
Line Length

Rank in terms of the mean. Rank in terms of how spread out the data is.

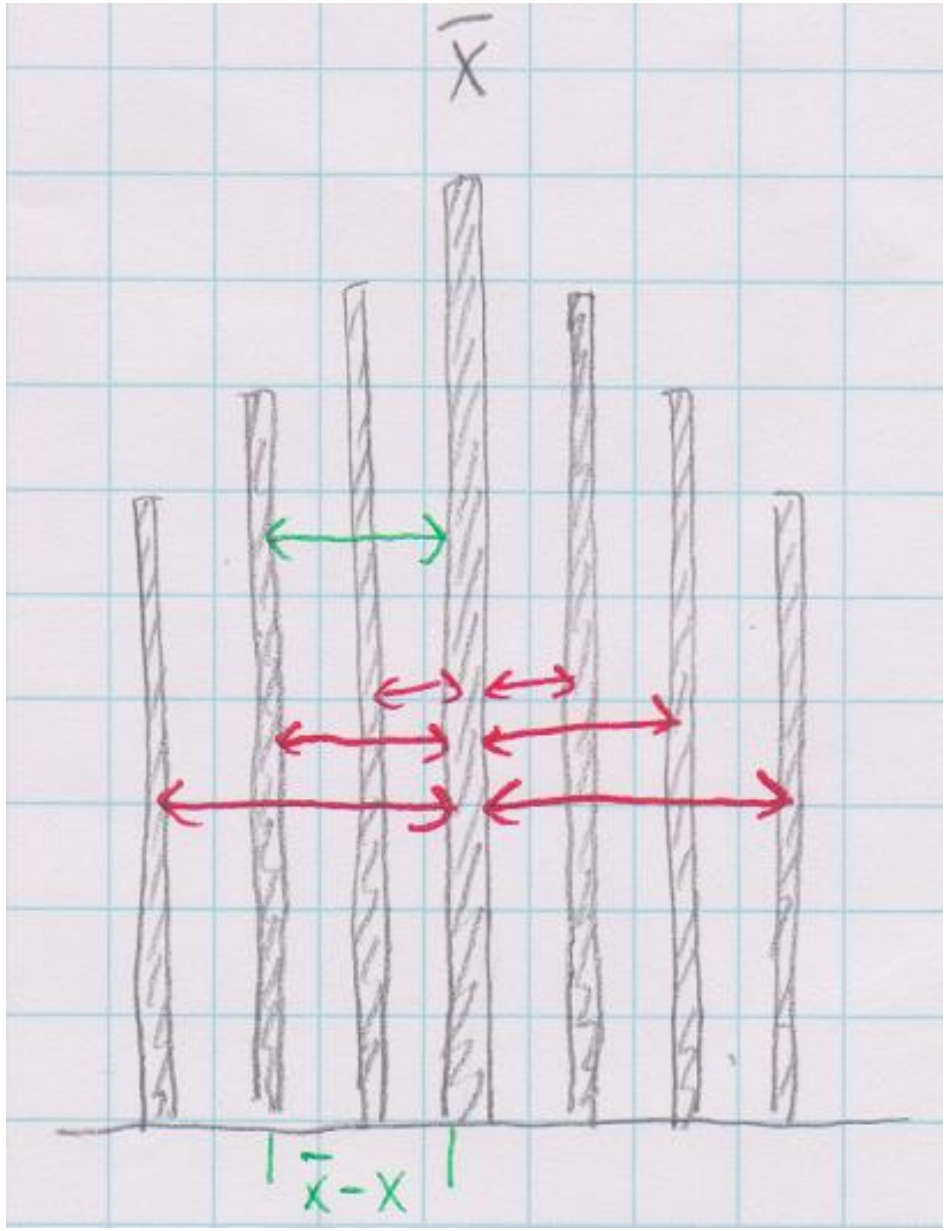




Which class is better A or B? Why?



Which class is better A or B? Why?

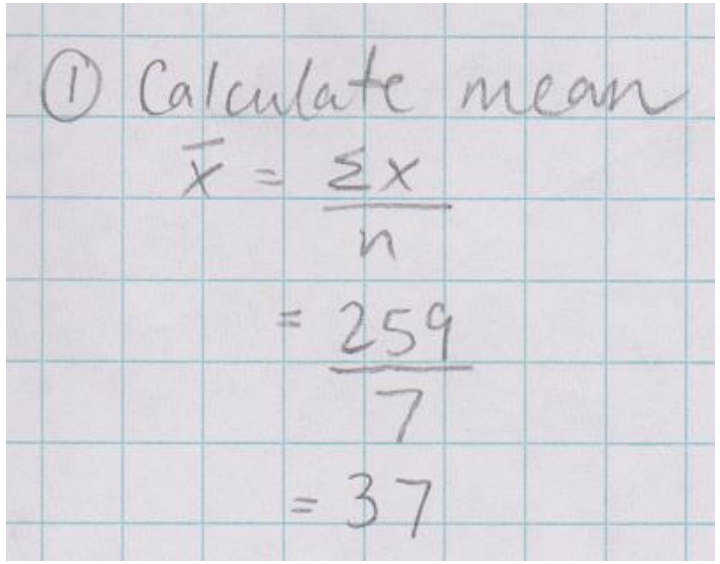


Regular Standard Deviation

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma = \sqrt{\frac{\sum(\bar{x} - x)^2}{n}}$$

Calculate the standard deviation of 34, 35, 23, 45, 47, 39, 36.



Calculate the standard deviation of 34, 35, 23, 45, 47, 39, 36.

① Calculate mean

$$\bar{x} = \frac{\Sigma x}{n}$$

$$= \frac{259}{7}$$

$$= 37$$

② Calculate pieces of standard dev. formula

x	$\bar{x} - x$	$(\bar{x} - x)^2$
34	3	9
35	2	4
23	14	196
45	-8	64
47	-10	100
39	-2	4
36	1	1

Calculate the standard deviation of 34, 35, 23, 45, 47, 39, 36.

① Calculate mean

$$\bar{x} = \frac{\Sigma x}{n}$$

$$= \frac{259}{7}$$

$$= 37$$

② Calculate pieces of standard dev. formula

x	$\bar{x} - x$	$(\bar{x} - x)^2$
34	3	9
35	2	4
23	14	196
45	-8	64
47	-10	100
39	-2	4
36	1	1

③ Calculate st. dev

$$\sigma = \sqrt{\frac{\Sigma (\bar{x} - x)^2}{n}}$$

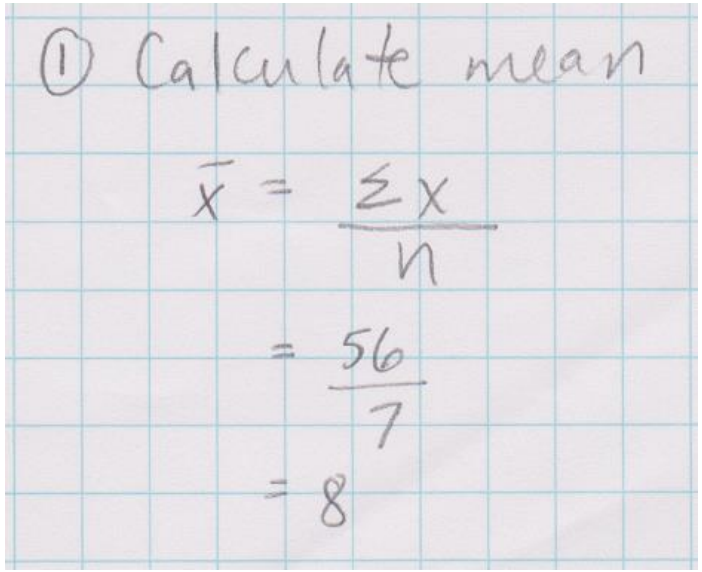
$$= \sqrt{\frac{378}{7}}$$

$$= \sqrt{54}$$

$$= 7.348$$

Calculate the standard deviation of 5, 6, 7, 8, 9, 10, 11.

Calculate the standard deviation of 5, 6, 7, 8, 9, 10, 11.



Calculate the standard deviation of 5, 6, 7, 8, 9, 10, 11.

① Calculate mean

$$\bar{x} = \frac{\Sigma x}{n}$$

$$= \frac{56}{7}$$

$$= 8$$

② Calculate pieces of st. dev

x	$\bar{x} - x$	$(\bar{x} - x)^2$
5	3	9
6	2	4
7	1	1
8	0	0
9	-1	1
10	-2	4
11	-3	9

Calculate the standard deviation of 5, 6, 7, 8, 9, 10, 11.

① Calculate mean

$$\bar{x} = \frac{\Sigma x}{n}$$

$$= \frac{56}{7}$$

$$= 8$$

② Calculate pieces of st. dev

x	$\bar{x} - x$	$(\bar{x} - x)^2$
5	3	9
6	2	4
7	1	1
8	0	0
9	-1	1
10	-2	4
11	-3	9

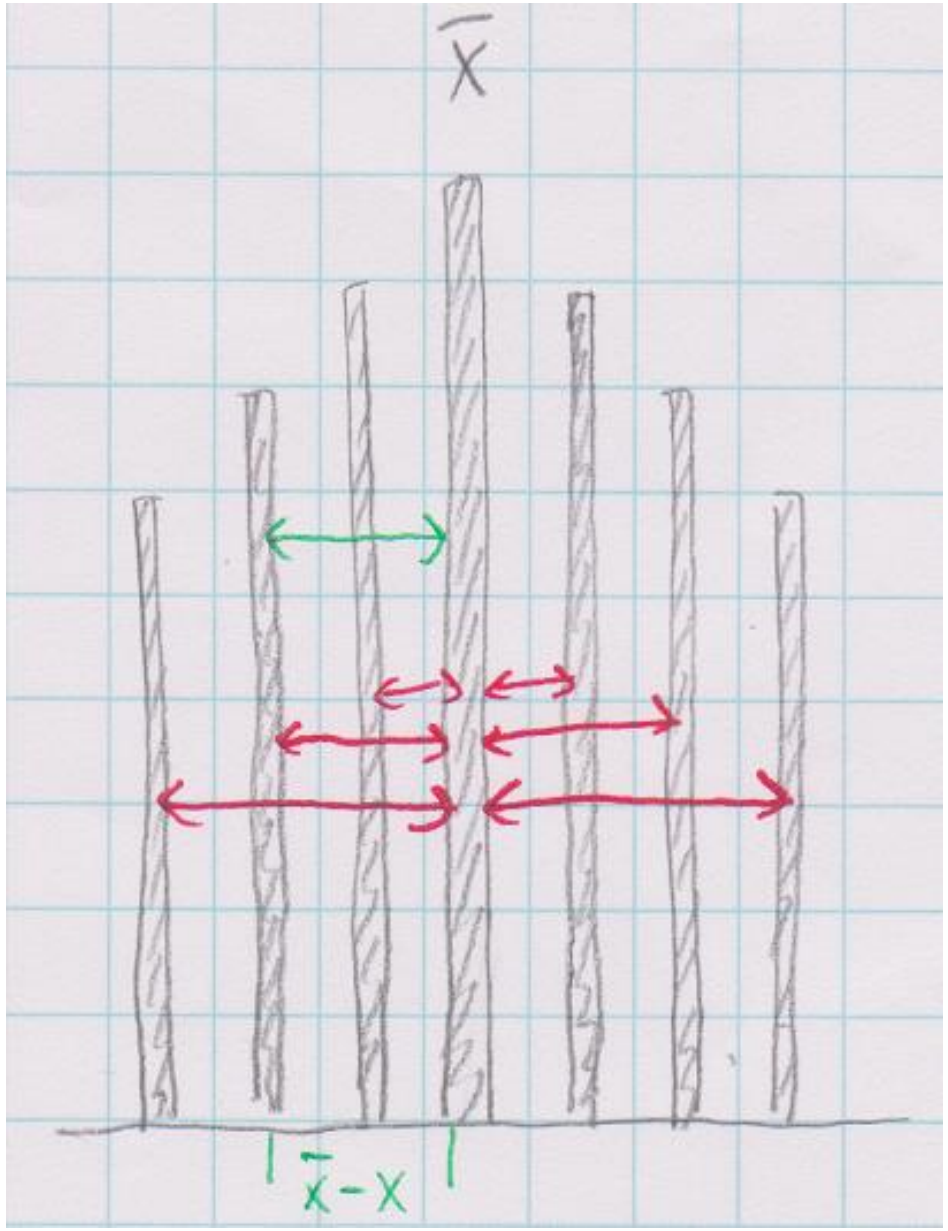
③ Calculate standard deviation

$$\sigma = \sqrt{\frac{\Sigma(\bar{x} - x)^2}{n}}$$

$$= \sqrt{\frac{28}{7}}$$

$$= \sqrt{4}$$

$$= 2$$



Standard Deviation with Frequencies

$$\bar{x} = \frac{\sum x * f}{\sum f}$$

$$\sigma = \sqrt{\frac{\sum f(\bar{x} - x)^2}{\sum f}}$$

Calculate the standard deviation of:

x	80	90	70	60	50	40
freq	2	1	7	4	6	4

Calculate the standard deviation of:

x	80	90	70	60	50	40
freq	2	1	7	4	6	4

This actually means:

80	90	70	60	50	40
80		70	60	50	40
		70	60	50	40
		70	60	50	40
		70		50	
		70		50	
		70			

Calculate the standard deviation of:

x	80	90	70	60	50	40
freq	2	1	7	4	6	4

① Pieces of Formula

x	frequency	x*freq	$\bar{x}-x$	$(\bar{x}-x)^2$	$f(\bar{x}-x)^2$
80	2	160	-20	400	800
90	1	90	-30	900	900
70	7	490	-10	100	700
60	4	240	0	0	0
50	6	300	10	100	600
40	4	160	20	400	1600
sum	24	1440			4600

Calculate the standard deviation of:

x	80	90	70	60	50	40
freq	2	1	7	4	6	4

② Calculate mean

$$\bar{x} = \frac{\Sigma x * f}{n}$$

$$= \frac{1440}{24}$$

$$= 60$$

① Pieces of Formula

x	frequency	x*freq	$\bar{x} - x$	$(\bar{x} - x)^2$	$f(\bar{x} - x)^2$
80	2	160	-20	400	800
90	1	90	-30	900	900
70	7	490	-10	100	700
60	4	240	0	0	0
50	6	300	10	100	600
40	4	160	20	400	1600
sum	24	1440			4600

Calculate the standard deviation of:

x	80	90	70	60	50	40
freq	2	1	7	4	6	4

① Pieces of Formula

x	frequency	x*freq	$\bar{x}-x$	$(\bar{x}-x)^2$	$f(\bar{x}-x)^2$
80	2	160	-20	400	800
90	1	90	-30	900	900
70	7	490	-10	100	700
60	4	240	0	0	0
50	6	300	10	100	600
40	4	160	20	400	1600
sum	24	1440			4600

② Calculate mean

$$\bar{x} = \frac{\Sigma x * f}{n}$$

$$= \frac{1440}{24}$$

$$= 60$$

③ Calculate standard dev

$$\sigma = \sqrt{\frac{\Sigma f(\bar{x}-x)^2}{n}}$$

$$= \sqrt{\frac{4600}{24}}$$

$$= 13.84437$$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