Find (i) $P(z \leq 1.23)$

$= 0.8907$

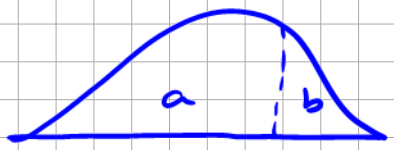
z scores so far only deal with

(i) positive

(ii) less thans

(ii) $P(z \geq 0.81)$

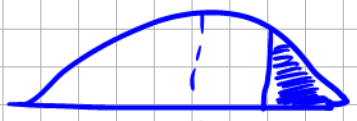
Tables only does less than but



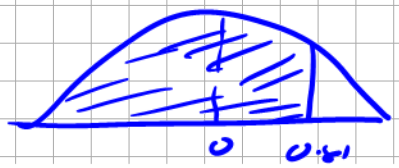
$a + b = 1$

$\Rightarrow b = 1 - a$.

Diagram must always end with less than  and a positive

$P(z \geq 0.81) =$ 

$\Rightarrow$ shade to right

$= 1 -$ 

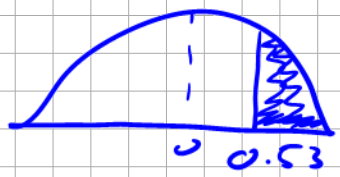
$= 1 - 0.7910$

$= 0.209$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	0.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	0.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	0.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	0.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	0.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	0.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	0.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	0.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	0.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	0.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621

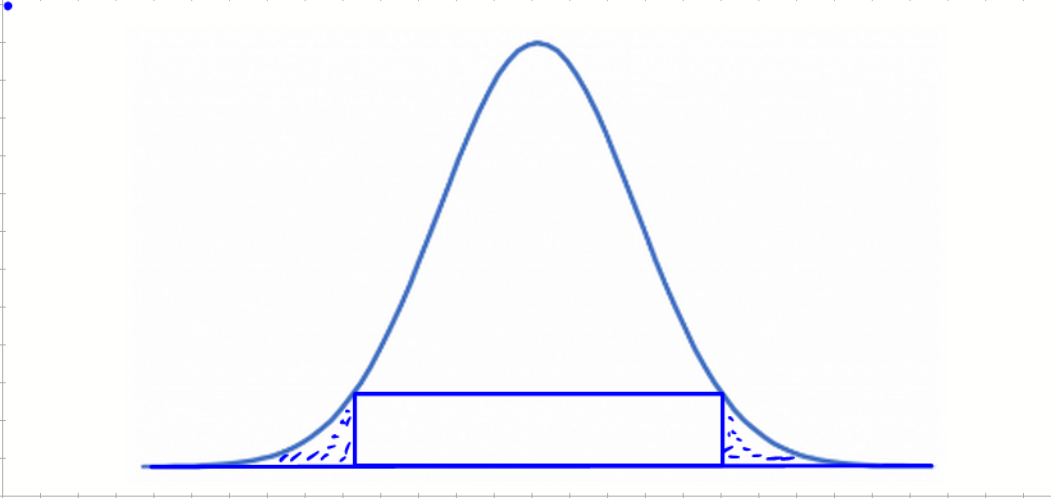
(iii) $P(z \leq 0.23)$  $= 0.591$

(iv) $P(z \geq 0.53)$

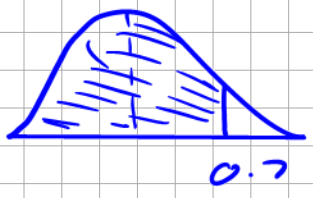
 $=$ $1 -$ 

$1 - 0.7019 = 0.2981$

z-scores have symmetry.



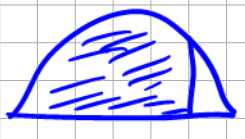
Find (i) $P(z \geq -0.7)$

 $=$ 

$P(z \geq -0.7) = P(z \leq 0.7)$

0.758

(ii) $P(z \leq -0.42)$

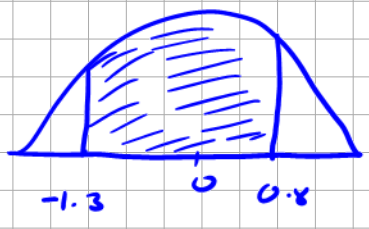
$=$  $=$  $=$ $1 -$ 

$= 1 - P(z \leq 0.42)$

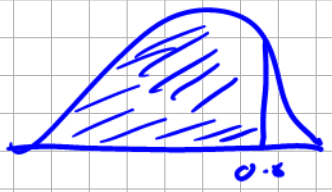
$= 1 - 0.6628$

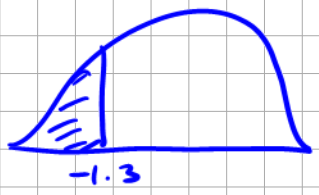
$= 0.3372.$

$P(-1.3 \leq z \leq 0.8)$



The shaded section is area. Area is less than z score.

$=$ 

$-$ 

$P(z \leq 0.8)$

$= 0.7881$

$=$ 

$= 1 -$ 

$1 - P(z \leq 1.3)$

$1 - 0.9032$

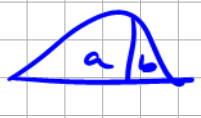
0.0968

Ans $0.7881 - 0.0968$

$= 0.6913$

3 things to take care of

(i) area is always less than

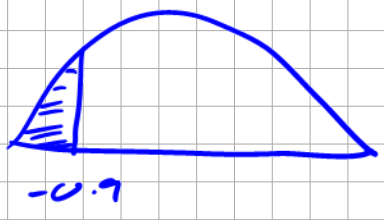
(ii) greater than = 

(iii) negatives . = symmetry

$P(-0.9 \leq z \leq 0.6)$

=

−



$P(z \leq 0.6)$

$= 1 -$

$1 - P(z \leq 0.9)$

$1 - 0.8159 = 0.1841$

$0.7257 - 0.1841$

$= 0.5416$

$P(z \leq k) = 0.6135$ find k.

$k = 0.29$

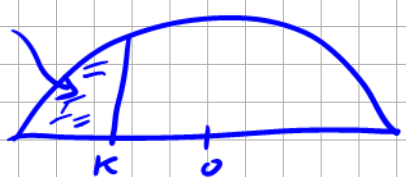
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	0.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	0.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	0.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	0.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	0.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	0.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	0.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	0.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	0.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	0.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621

$P(z \leq k) = 0.36$ find k.

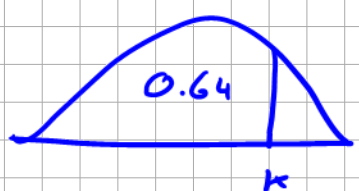
Inside main body looking for 0.36

Smallest number is 0.5 so that means k is negative

0.36



=



$k < 0$ $\quad P(z \leq k) = 0.64$

$k = 0.36 \Rightarrow -k = 0.36$

Ans $\quad k = -0.36$.

Convert into z scores

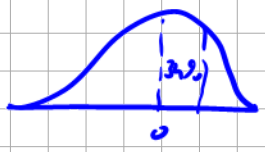
$$z = \frac{x - \mu}{\sigma}$$

μ = population mean
σ = standard deviation.

Exam $\mu = 56\%$ and $\sigma = 3\%$. I got 59%. What is my z score and my place in class?

$\mu = 56$ $\sigma = 3$ $x = 59$

$$z = \frac{x - \mu}{\sigma} = \frac{59 - 56}{3} = 1$$



$P(z \leq 1) = 0.84$

In class of 100 I'm 84th from bottom or 16th from top.

Maths test $\mu = 73\%$ $\sigma = 6\%$ I got 78%
Irish test $\mu = 56\%$ $\sigma = 4\%$ I got 59%.
Which was better comparable result.

Maths $z = \frac{x - \mu}{\sigma} = \frac{78 - 73}{6} = \frac{5}{6}$

Irish $z = \frac{59 - 56}{4} = \frac{3}{4}$

$\frac{5}{6} > \frac{3}{4}$

I did better in maths compared to rest of class.

A pack of crisps is 450g on average. The standard deviation is 5g. From 1,200 packs weighed find number between 444g and 453g.

$\mu = 450 \quad \sigma = 5$

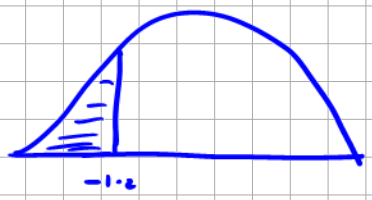
$444 \leq x \leq 453$

$z = \frac{x - \mu}{\sigma} = \frac{444 - 450}{5} = \frac{-6}{5} = -1.2$

$z = \frac{453 - 450}{5} = 0.6$

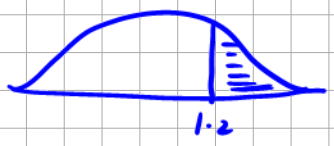
=

−



$P(z \leq 0.6)$

$= 0.7257$



1 −

$1 - P(z \leq 1.2)$

$1 - 0.8849$

0.1151

$0.7257 - 0.1151$

0.6106

No of pack $1200(0.6106) = 732.7$

$= 733$

Average yield is 7,000 Litres and standard deviation is 400 Litres. What number of my 450 cows will yield between 6800 and 7300 Litres. I cull (drop) the bottom 15% of cows (yield). What production levels are they at?

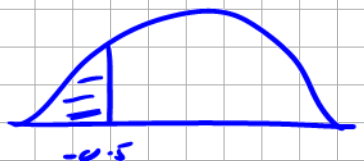
$\mu = 7000 \qquad \sigma = 400$

$6{,}800 \leq x \leq 7{,}300$

$z = \frac{x - \mu}{\sigma} = \frac{6800 - 7000}{400} = -0.5$

$z = \frac{7300 - 7000}{400} = 0.75$

$=$ 

$-$ 

$P(z \leq 0.75) = 0.7734$ 

$= 1 -$ 

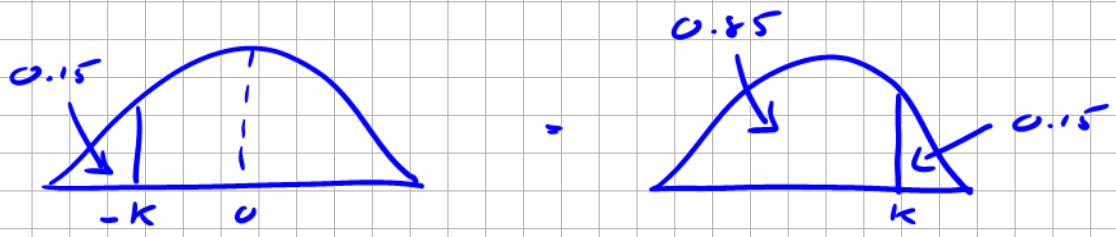
$1 - P(z \leq 0.5)$

$1 - 0.6915$

0.3085

$0.7734 - 0.3085 = 0.4649$

$450(0.4649) = 209.3 = 210$



$P(z \leq k) = 0.85$

$k = 1.04$

$\Rightarrow \quad k = -1.04$

$$\frac{x-\mu}{\sigma} = -1.04$$

$$\frac{x-7000}{400} = -1.04$$

$x = 6584$ litres

A car drives on average 48km per litre. The standard deviation is 3km per litre. Out of 1,200 car how many will have consumption rates of between 44 km and 50km per litre. How many cars are under 43 km/litre?

$\mu = 48 \qquad \sigma = 3$

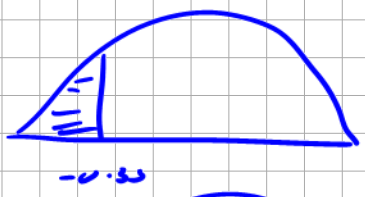
$44 \leq x \leq 50$

$$z = \frac{x-\mu}{\sigma}$$

$x = 44 \qquad z = \frac{-4}{3} = -1.33$

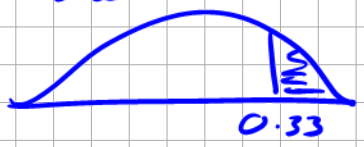
$x = 50 \qquad z = \frac{2}{3} = 0.67$

−



$P(z \leq 0.67)$

0.7486



$1 -$

$1 - P(z \leq 0.33)$

$1 - 0.9082$

0.0918

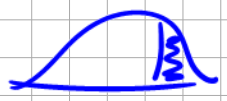
$0.7486 - 0.0981 = 0.6568$

$1200(0.6568) = 789$

$x \leq 43$

$z = \frac{43-48}{3} = -\frac{5}{3} = -1.67$

$P(z \leq -1.67)$



$1 - P(z \leq 1.67)$

$1 - 0.9525$

0.0475

$0.0475(1200) = 57.$