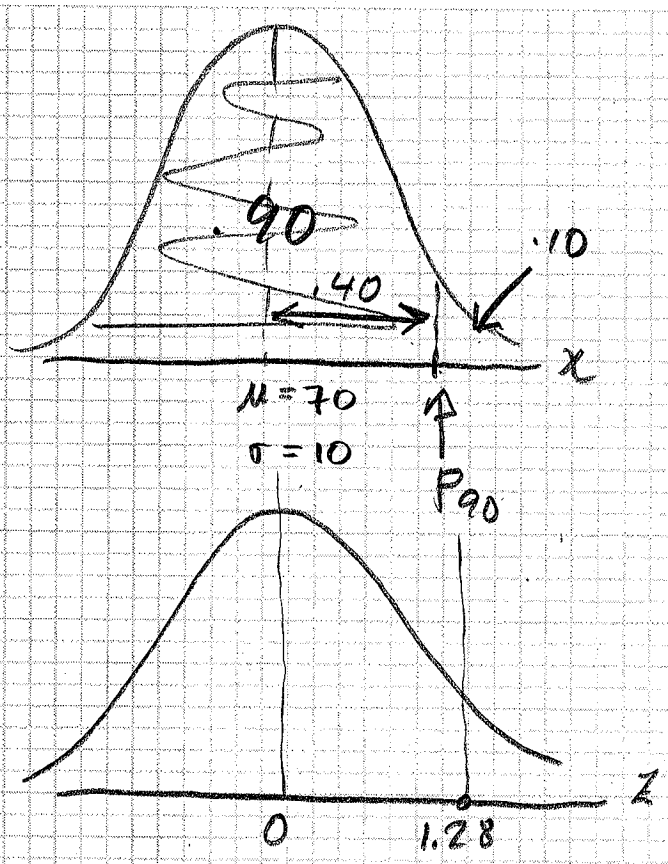
Percentiles

Example:

The 90th percentile is the score which has 90% of the scores below it



$$Z = \frac{x-\mu}{\sigma} \Rightarrow$$

$$\Rightarrow x = \mu + Z \cdot \sigma$$

$$= 70 + 1.28 \times 10$$

$$= 82.8 = P_{90}$$

Example 9, 14, 2, 11, 19, 3, 17, 15 N = 8

$P_{25} = ?$

Sorted: 2, 3, 9, 11, 14, 15, 17, 19

25% of 8 = .25 * 8 = 2

Definition 1

P_{25} is the score that is greater than 25% of the scores $\Rightarrow P_{25} = 9$

Definition 2

P_{25} is the score that is greater than or equal than 25% of the scores $\Rightarrow P_{25} = 3$

What if $N=7$?

2, 3, 9, 11, 14, 15, 17

25% of 7 $= .25 * 7 = 1.75$

How do we handle roundings?

One approach

1) Location $\frac{25}{100} \times n = .25 * 7 = 1.75 = L$

2) If L is not an integer, round up

$L = 2$ and $P_{25} = X_2 = 3$

3) If L is an integer, which is what happened in our previous sample

2, 3, 9, 11, 14, 15, 17, 19 $N=8$

$L = \frac{25}{100} \times 8 = 2$ then $P_{25} = \frac{X_2 + X_3}{2}$

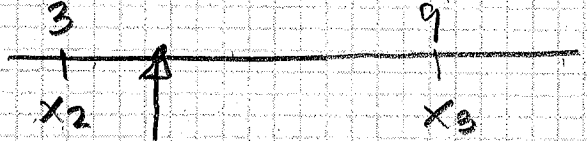
$= \frac{3+9}{2} = \frac{12}{2} = 6$

Another Approach

1) Calculate the Location $L = .25(n+1) =$

$= .25(8+1) = 2.25$

integer portion I — decimal portion D



$P_{25} = X_2 + .25(X_3 - X_2)$

$3 + .25 * 6 = 4.5$