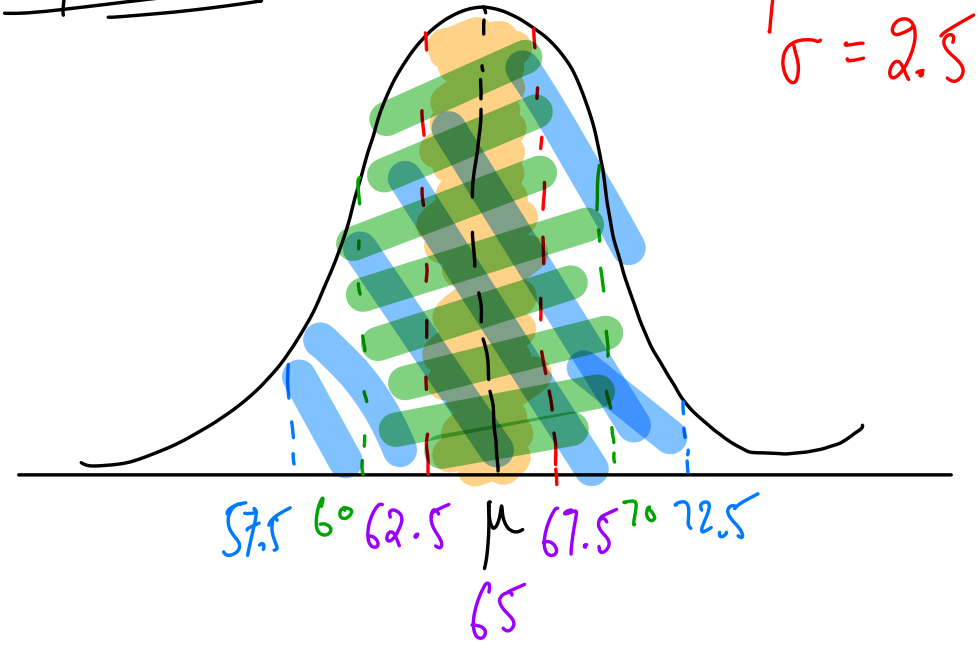
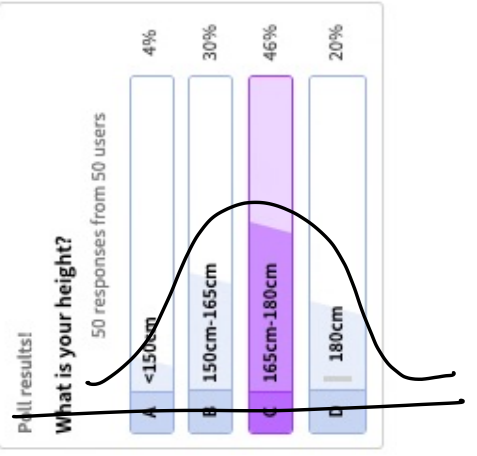
GAUSSIAN DISTRIBUTION-2

68/95/99 Rule

$\mu = 65$

$\sigma = 2.5$

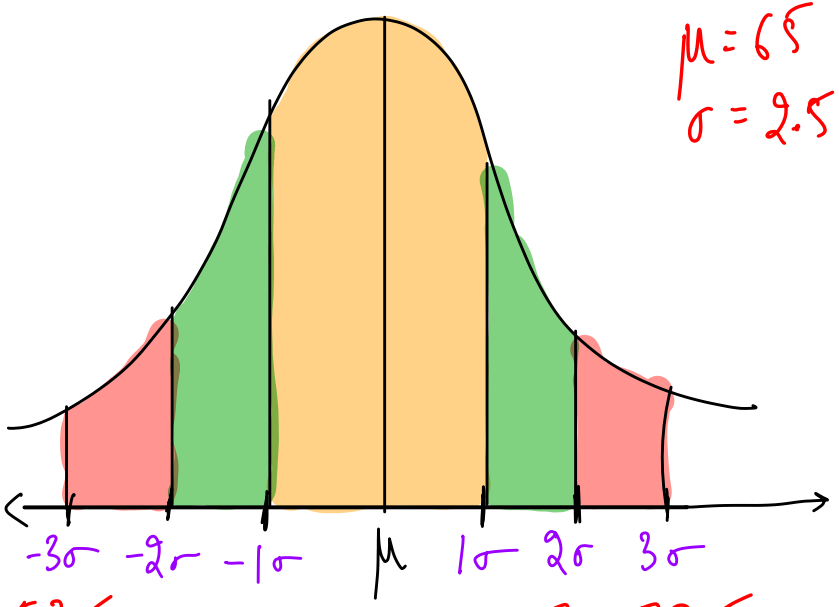




68% with 1σ

95% within 2σ

99% within 3σ



$$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

① $P[62.5 < X < 67.5] = 0.68$

② $P[60 < X < 67.5] = 0.815$

③ $P[57.5 < X < 70] = 0.97$

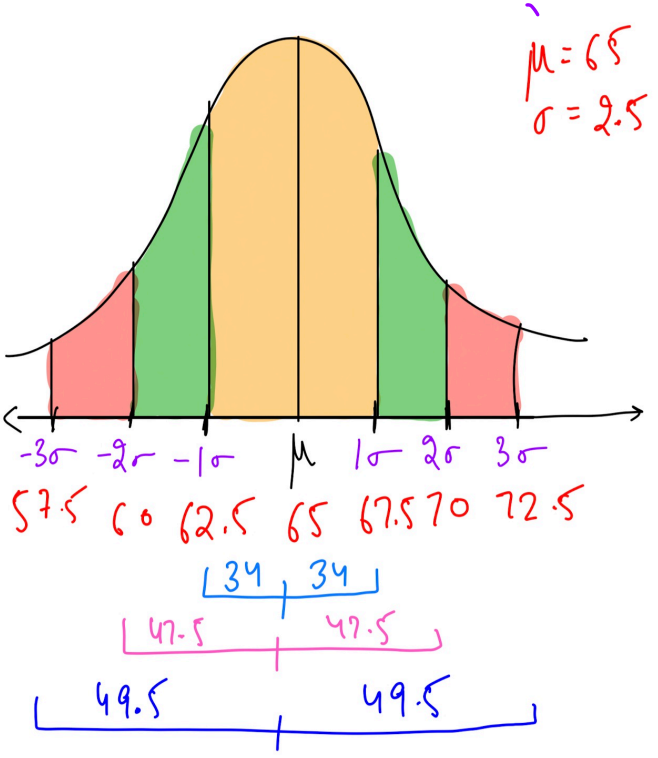
④ $P[67.5 < X < 70] = .135$

⑤ $P[X < 70] = 0.975$

The height of people is Gaussian with mean 65 inches and standard deviation 2.5 inches.
What is the fraction of people whose height is between 60 and 72.5?

40 users have participated

A	0.68	13%
B	0.895	40%
✓ C	0.9735	47%
D	0.997	0%



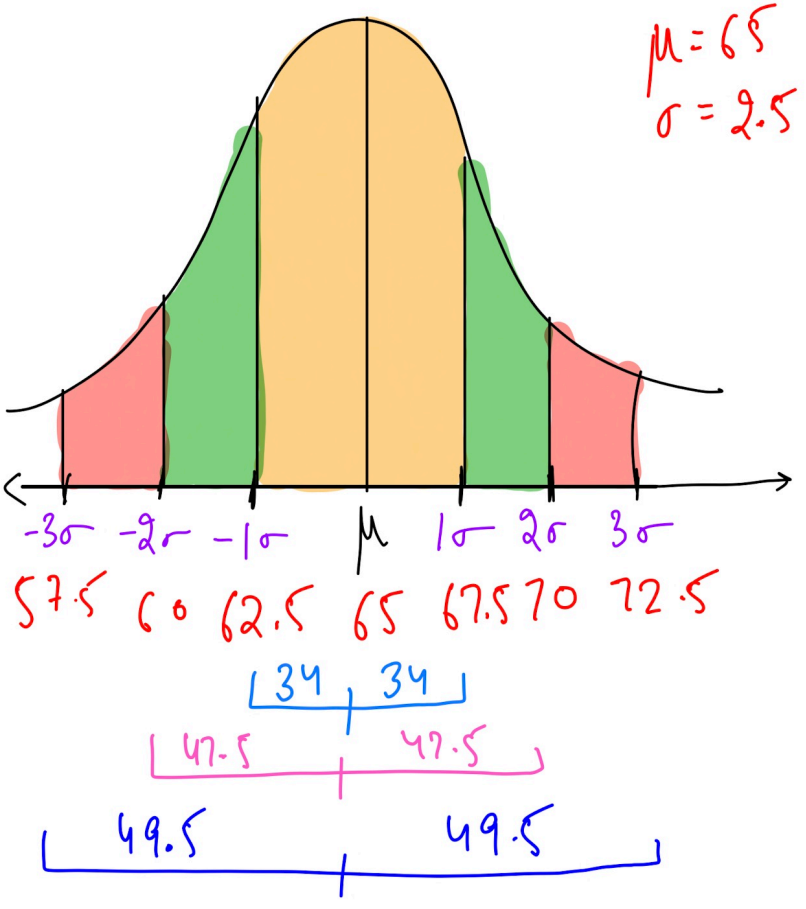
The height of people is Gaussian with mean 65 inches and standard deviation 2.5 inches.

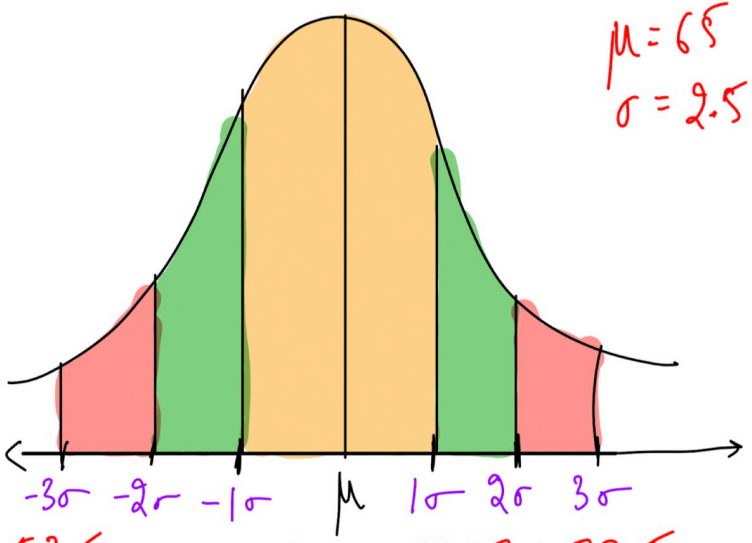
What fraction of people are shorter than 67.5?

49 users have participated

A	0.34	6%
B	0.68	16%
✓ C	0.84	73%
D	0.95	4%

$50 + 34 = 84\%$





$57.5 = 65 + (-3)(2.5)$

$60 = 65 + (-2)(2.5)$

$62.5 = 65 + (-1)(2.5)$

$65 = 65 + 0(2.5)$

$67.5 = 65 + (+1)(2.5)$

$70 = 65 + (+2)(2.5)$

$72.5 = 65 + (+3)(2.5)$

std dev away from mean to reach a point.

$x = \mu + (z)\sigma$

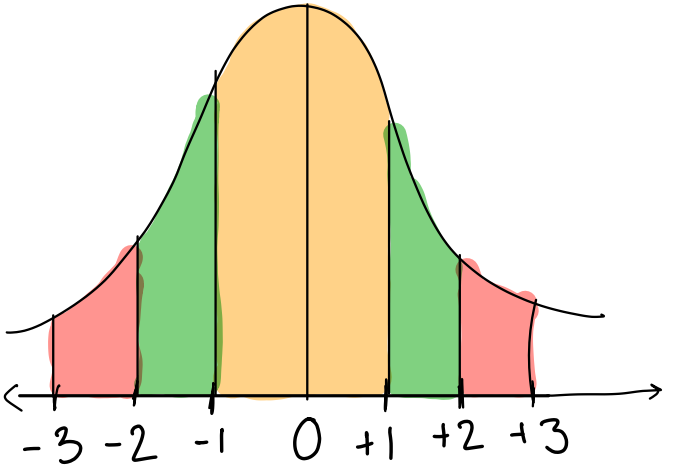
$$x = \mu + (z)\sigma$$

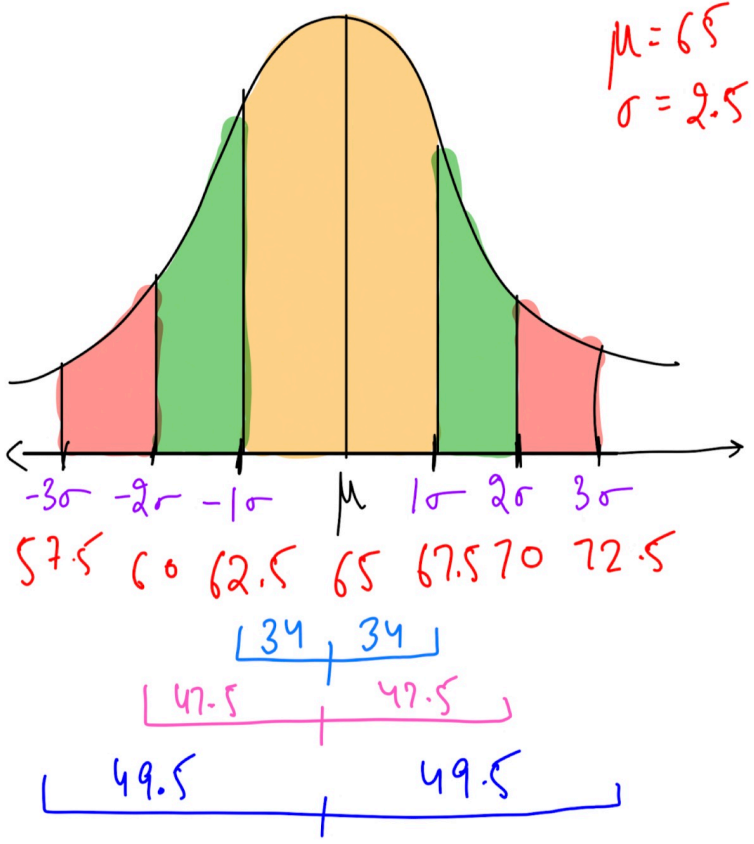
$$\Rightarrow \boxed{Z = \frac{x - \mu}{\sigma}}$$

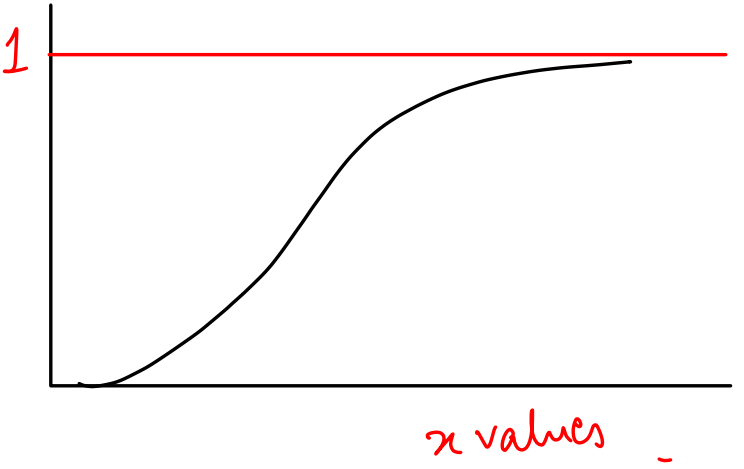
→ Z Score

$$z = \frac{66 - 65}{2.5}$$

$$z = 0.4$$







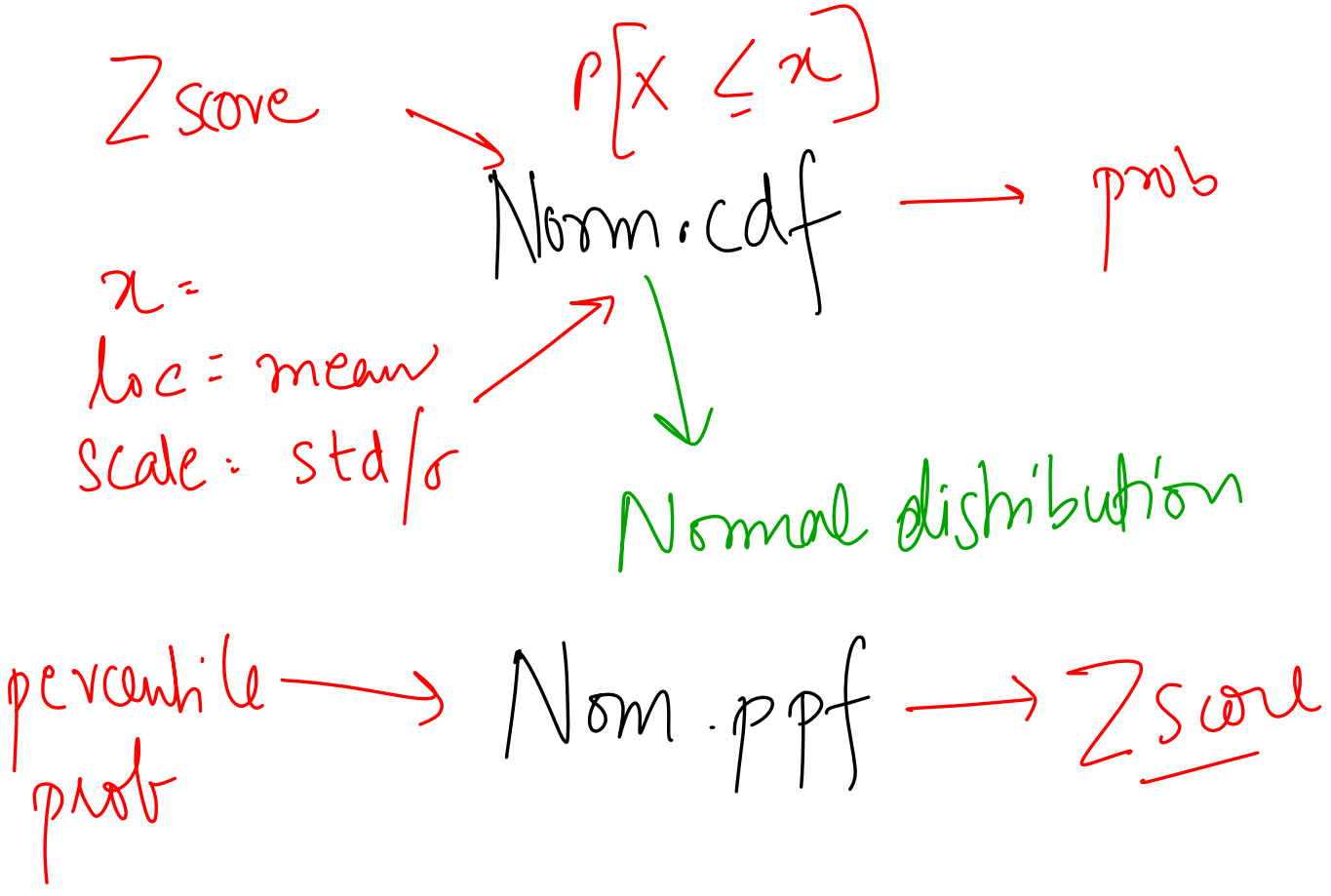
Scipy.stats

norm

norm.cdf

norm.ppf

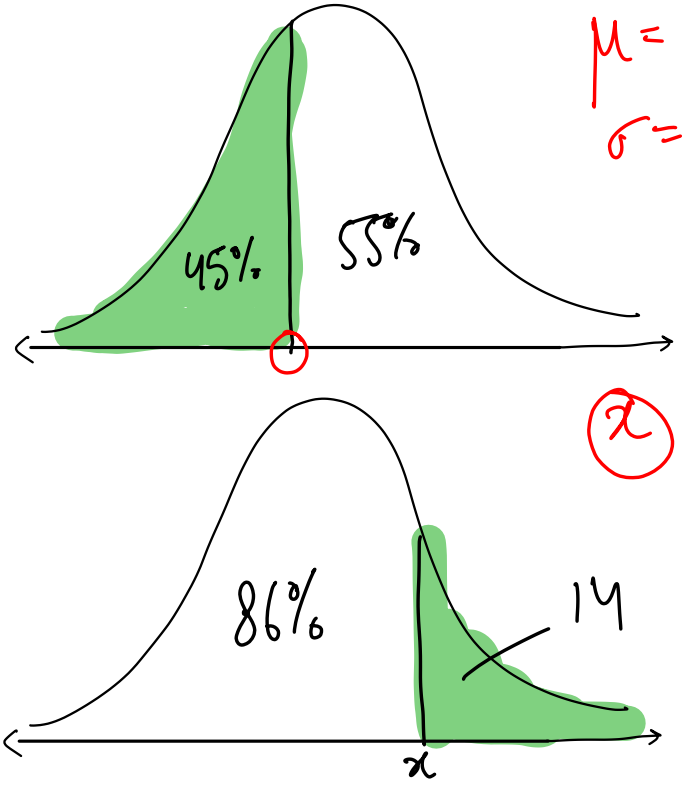
Percent Point Function


Z score
P[X ≤ x]
Norm.cdf
prob
x =
loc = mean
scale = std/σ
Normal distribution
percentile
prob
Norm.ppf
Z score

Given a normal distribution with μ= 40 and σ= 6, find the value of x that has
(a) 45% of the area to the left and
(b) 14% of the area to the right.

(a) 39.24

(b) 46.48

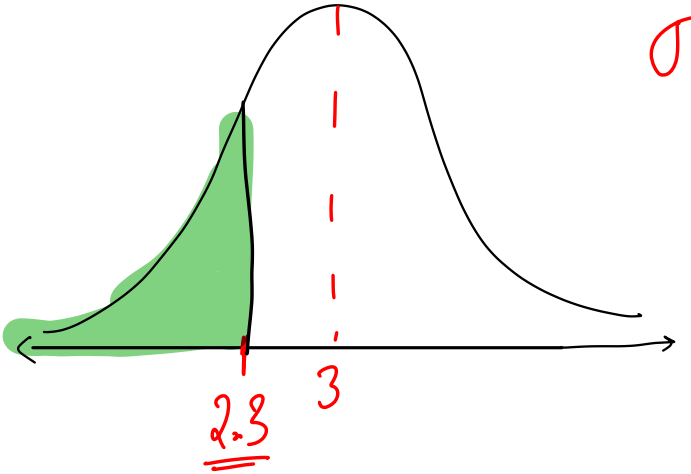


A certain type of storage battery lasts, on average, 3.0 years with a standard deviation of 0.5 year. Assuming that battery life is normally distributed, find the probability that a given battery will last less than 2.3 years.

$\mu = 3$

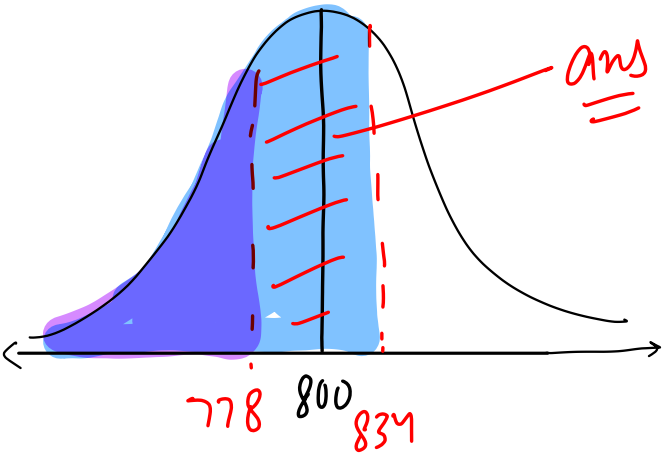
$\sigma = 0.5$

$P = 0.0807$



An electrical firm manufactures light bulbs that have a life, before burn-out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours.
Find the probability that a bulb burns between 778 and 834 hours

$p = 0.511$



$\mu = 800$

$\sigma = 40$

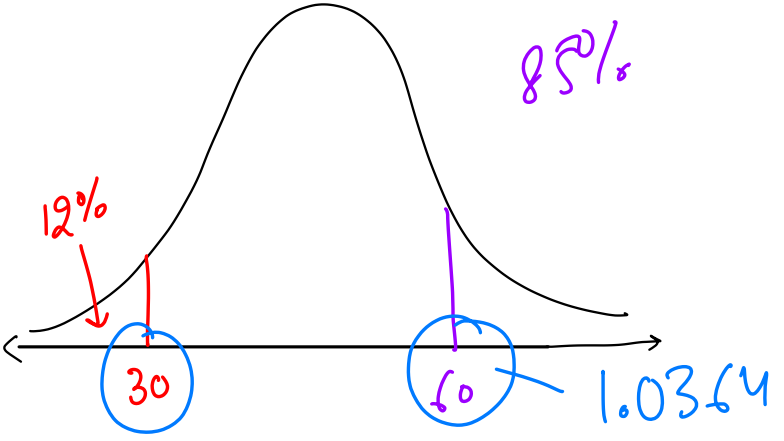
In a normal distribution, 12% of the items are under 30 and 85 % are under 60. Find the mean and standard deviation of the distribution.

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

$$-1.17 = \frac{30 - \mu}{\sigma} \quad (1)$$

$$1.03 = \frac{60 - \mu}{\sigma} \quad (2)$$

μ , σ



$$-1.17\sigma = 30 - \mu$$

$$-1.03\sigma = -60 + \mu$$

$$+0.14\sigma = 30$$

$$\sigma = \frac{30}{0.14}$$

Balls produced by a manufacturer have a mean = 50mm and standard deviation = 2 mm.
Assume Gaussian.

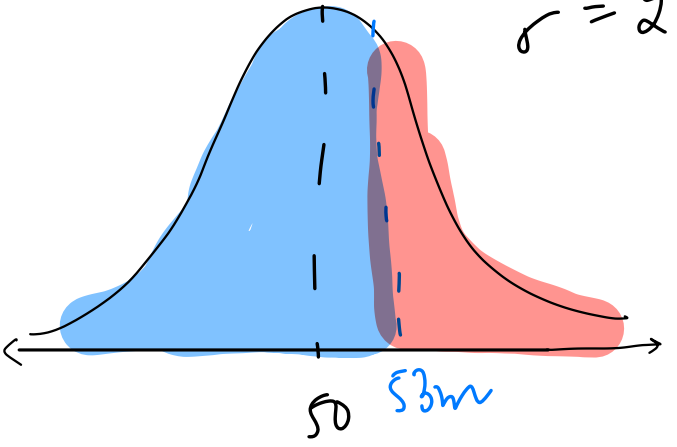
(a) p[46< X < 54]

(b) Fraction of balls with diameter less than 53mm?

(c) What is the 69th percentile?

$\mu = 50$

$\sigma = 2$



Skaters take an average of 7.42 seconds and Standard Deviation of 0.34 secs for 500m.
If I want to be faster than 95% of the people, what should be my speed?

s t d

$\mu = 7.42$

$\sigma = 0.34$

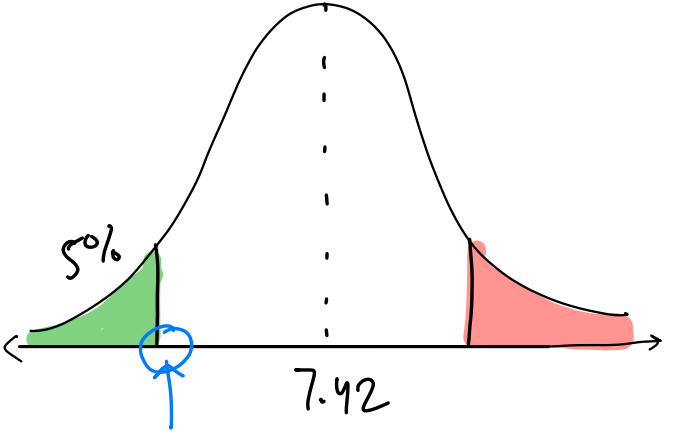
6.86 secs

$s = \frac{d}{t} = \frac{500m}{6.86s} =$

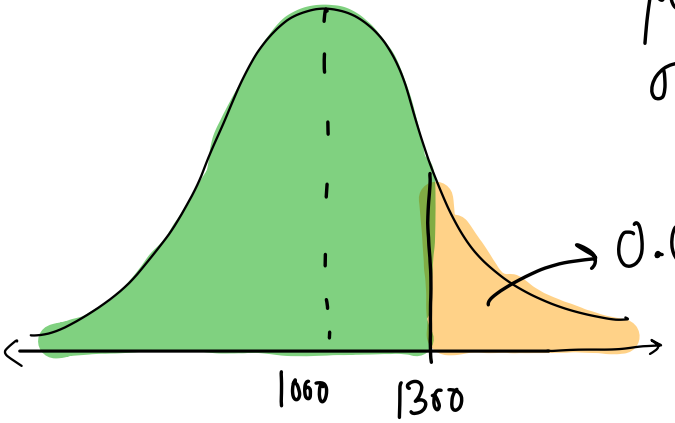
↳ 72.8783 m/s

22 users have participated

A	6.86 m/s	23%
B	62.6 m/s	23%
C ✓	72.8 m/s	36%
D	83.7 m/s	18%



A retail outlet sells around 1000 toothpaste per week. The Std. of sales is 200.
If the on-hand inventory is around 1300. What is need of replenishment?



$\mu = 1000$

$\sigma = 200$

0.067

6.7%

1 − green = orange

A retail outlet sells around 1000 toothpaste tubes a week, with std dev = 200. Assume Gaussian.

If the on-hand inventory is 1300, what is the probability in any week that they will have to replenish stock?

24 users have participated

✓	A	0.067	38%
	B	0.097	33%
	C	0.120	17%
	D	0.150	12%