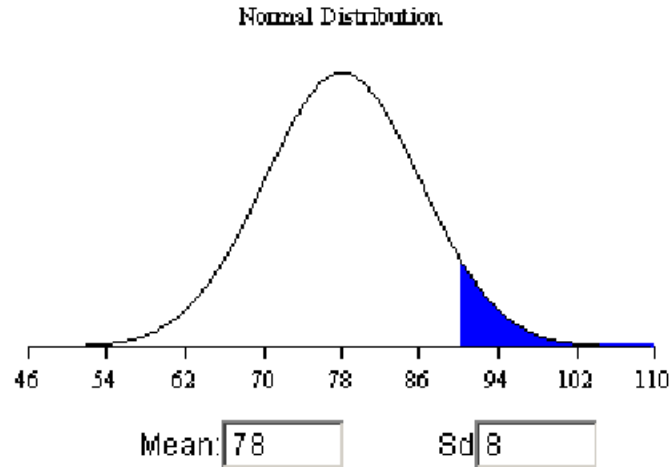


Normal Model for Exam Score

Population mean: $\mu=78$

Population standard deviation: $\sigma=8$

1. What is the probability one score, chosen at random, will fall above 90?
 - a. Draw a picture.



- b. Standardize

$$z = \frac{y - \mu}{\sigma} = \frac{90 - 78}{8} = 1.50$$

- c. Use Table Z.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.4										
1.5	0.9332									
1.6										
1.7										
1.8										
1.9										

93.32% of scores are less than 90.

$1 - 0.9332 = 0.0668$ or 6.7% of scores are 90 or above.

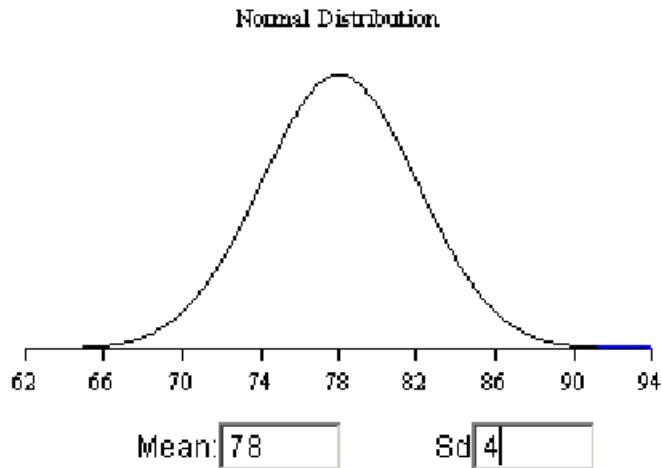
There is a 6.7% probability that a score selected at random will be 90 or above.

2. What is the probability that the average of 4 scores, chosen at random, will fall above 90?

mean of \bar{y} : $\mu = 78$

standard deviation of \bar{y} : $SD(\bar{y}) = \frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{4}} = 4$

- a. Draw a picture.



- b. Standardize

$$z = \frac{y - \mu}{\sigma} = \frac{90 - 78}{4} = 3.00$$

- c. Use Table Z.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2.9										
3.0	0.9987									
3.1										
3.2										
3.3										

99.87% of averages of 4 randomly selected scores are less than 90.

$1 - 0.9987 = 0.0013$ or 0.1% of averages of 4 randomly selected scores are 90 or above.

There is only a 0.1% probability that an average of 4 randomly selected scores will be greater than 90.

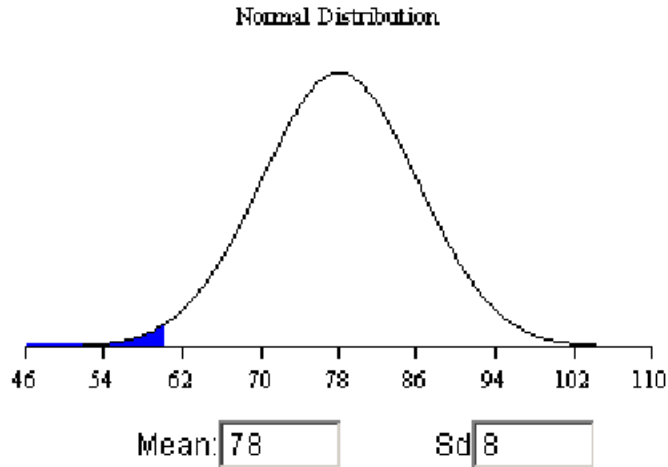
Normal Model for Exam Score (continued)

Population mean: $\mu=78$

Population standard deviation: $\sigma=8$

3. What is the probability one score, chosen at random, will fall below 60?

a. Draw a picture.



b. Standardize

$$z = \frac{y - \mu}{\sigma} = \frac{60 - 78}{8} = -2.25$$

c. Use Table Z.

0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	z
										-2.0
										-2.1
										0.0122 ←
										-2.3
										-2.4

1.22% of scores are less than 60.

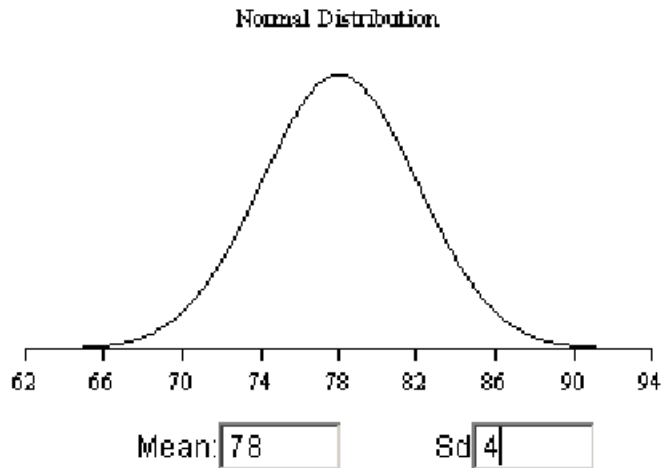
There is a 1.2% probability that a score selected at random will be less than 60.

4. What is the probability that the average of 4 scores, chosen at random, will fall below 60?

mean of \bar{y} : $\mu = 78$

standard deviation of \bar{y} : $SD(\bar{y}) = \frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{4}} = 4$

- a. Draw a picture.



- b. Standardize

$$z = \frac{y - \mu}{\sigma} = \frac{60 - 78}{4} = -4.50$$

- c. Use Table Z.

0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	z
										Off the table
										-4.5
0.0001										-3.8
										-3.7
										-3.6
										-3.5

There is less than a 0.0001 probability of averages of 4 randomly selected scores being less than 60.

There is virtually no chance that an average of 4 randomly selected scores will be less than 60.