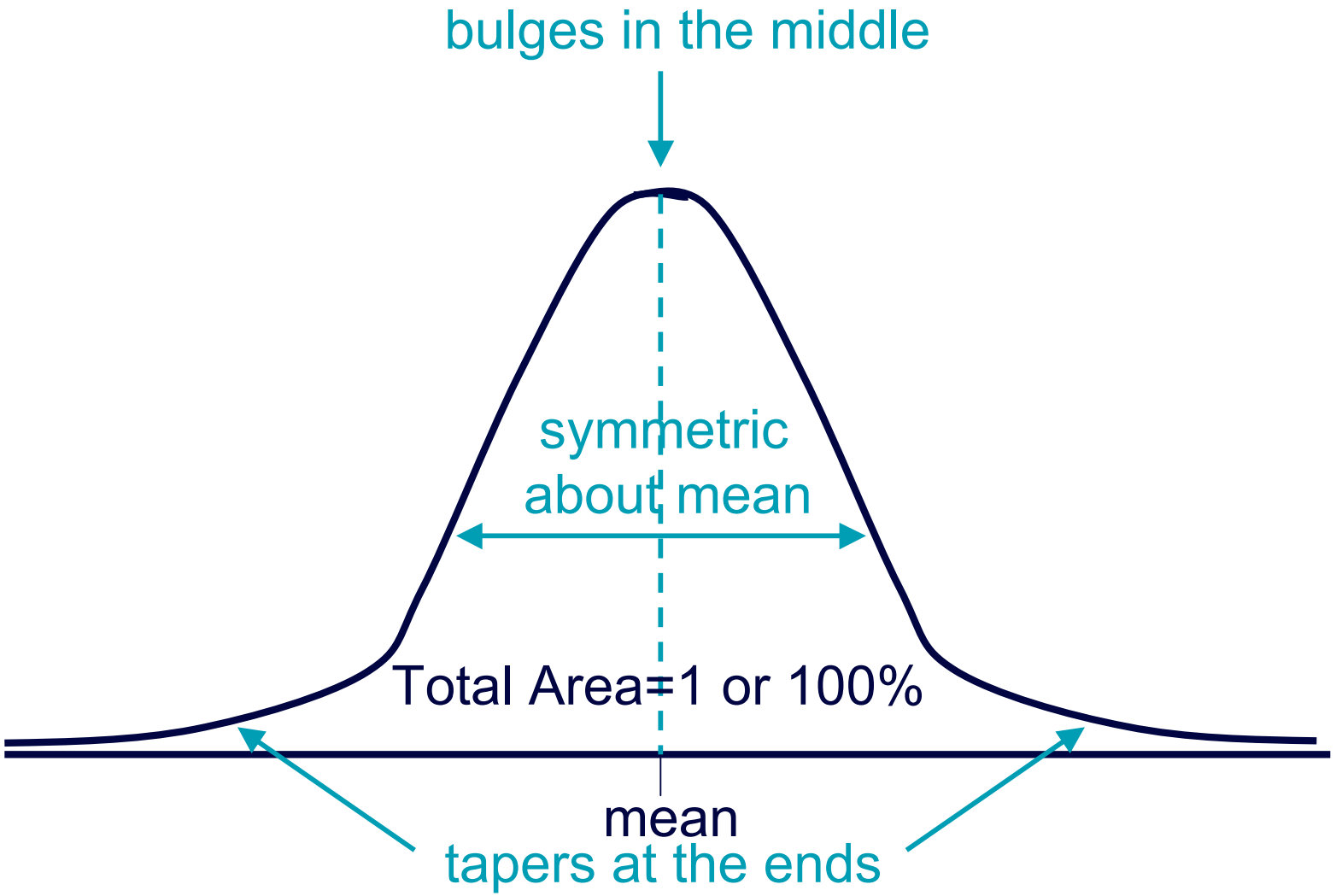
Lecture 11/Review Chapter 8 Normal Practice Exercises

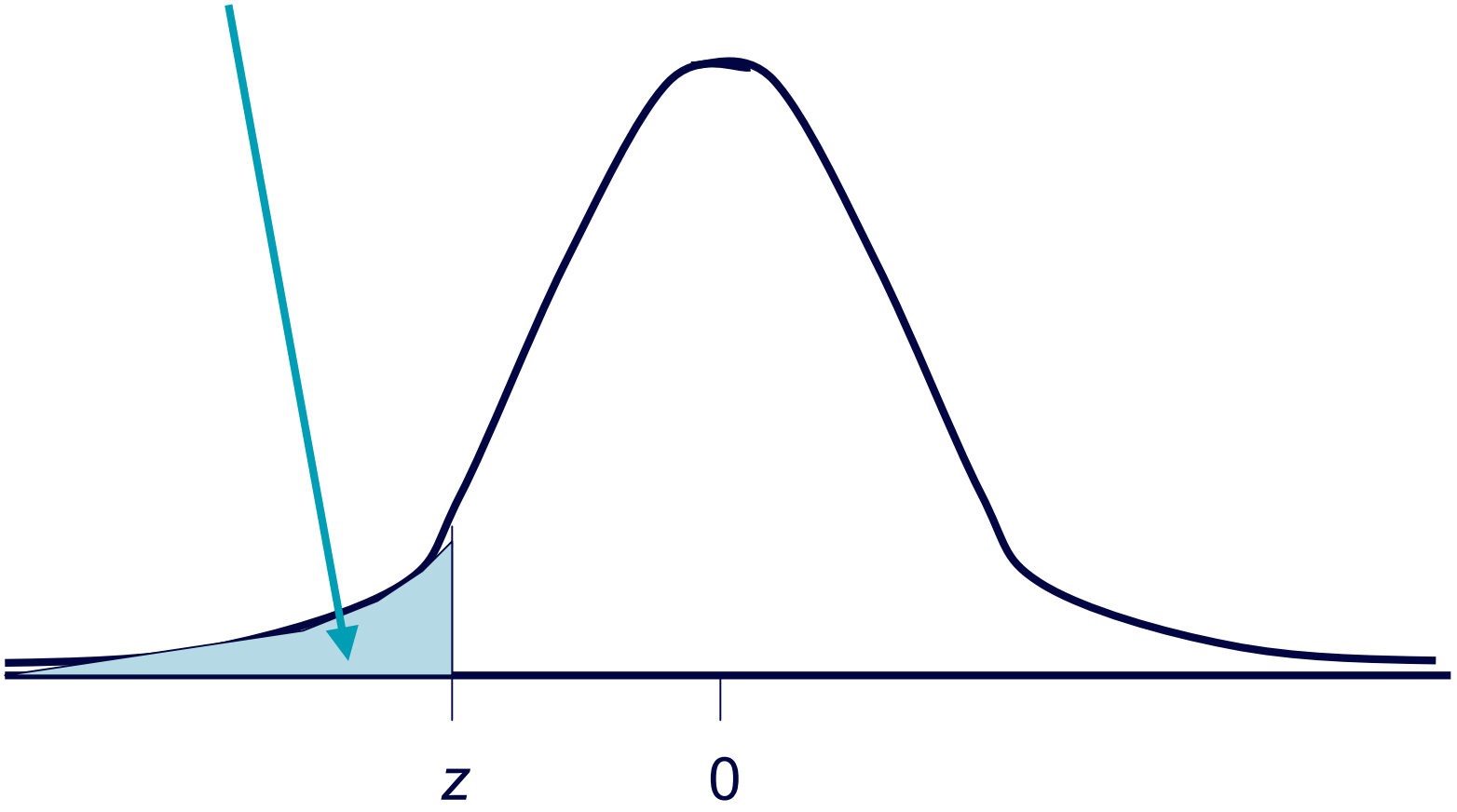
- Strategies to Solve 2 Types of Problem
- Examples

Properties of Normal Curve *(Review)*



Using Table 8.1 page 157

- For a given standard score z, the table shows the proportion or % of standard normal values below z.



Standardizing Values of Normal Distribution

Put a value of a normal distribution into perspective by standardizing to its *z*-score:

$$z = \frac{\text{observed value - mean}}{\text{standard deviation}}$$

If we know the *z*-score, we can convert back:

$$\text{observed value} = \text{mean} + (z \times \text{standard deviation})$$

Strategies for 2 Types of Problem

A. Given normal value, find proportion or %:

- Calculate z=(observed-mean)/sd [sign + or -?]
- Look up proportion in Table [adjust if asked for proportion *above* or *between,* not *below*]

B. Given proportion or %, find normal value:

- [adjust if asked for proportion *above* or *between*] Locate proportion in Table, find z.
- Unstandardize: observed = mean + (z × sd)

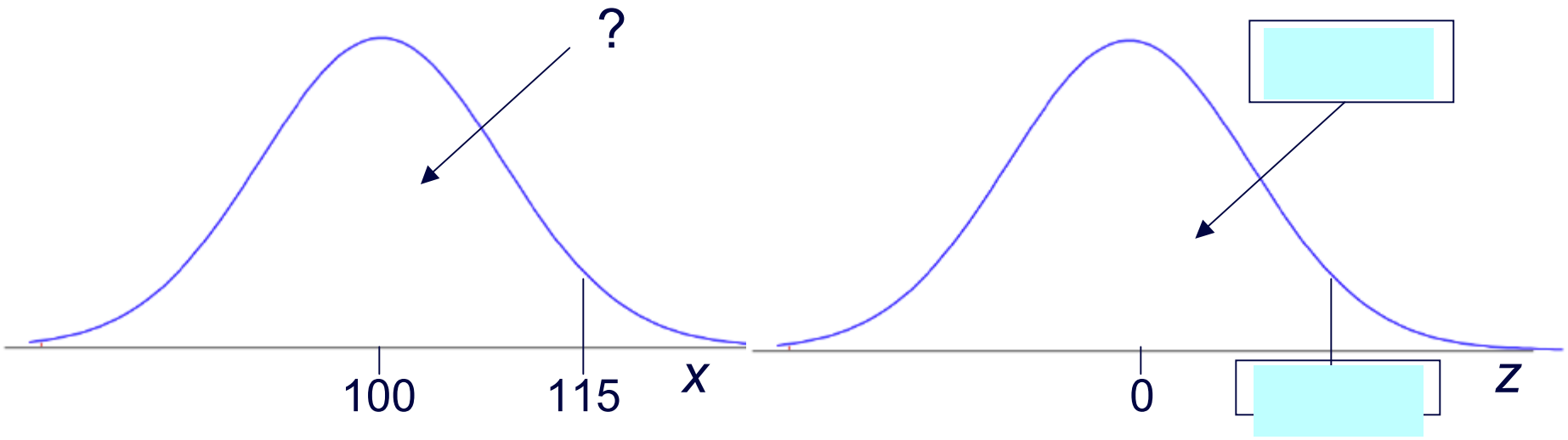
SKETCH! *We'll assume all examples today follow a normal curve...*

Example: *Normal Exercise #1A*

- **Background**: Scores *x* have mean 100 pts, sd 10 pts.
- **Question:** What % are below 115 pts?
- **Response:**

Table➔

Answer: % are below 115 pts.

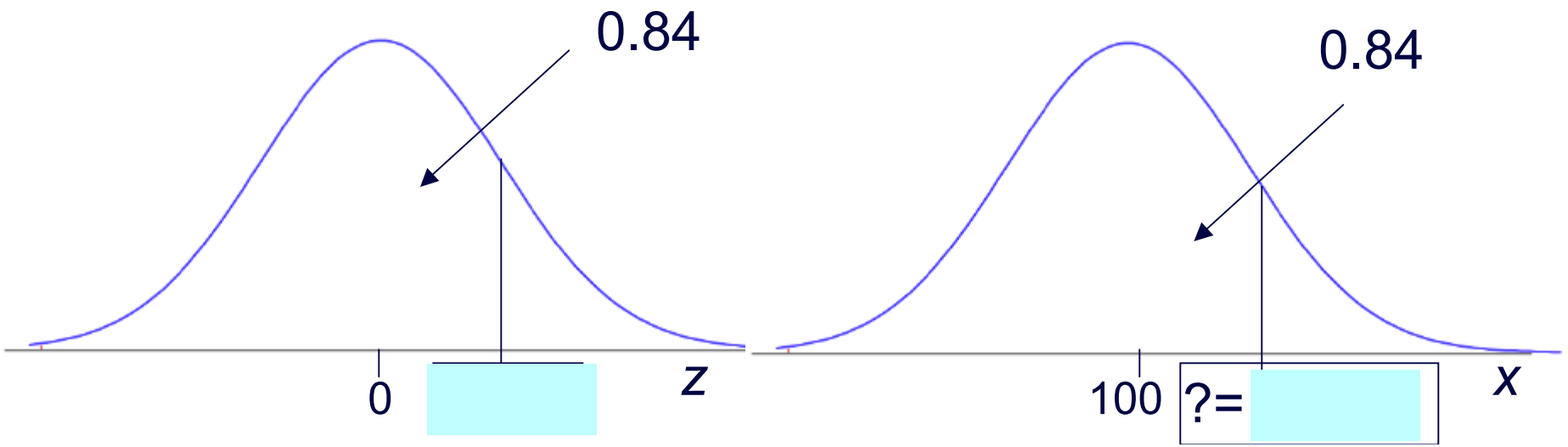


Example: *Normal Exercise #1B*

- **Background**: Scores *x* have mean 100 pts, sd 10 pts.
- **Question:** The lowest 84% are below how many pts?
- **Response:** Table➔

Unstandardize to *x*=

Answer: The lowest 84% are below pts.

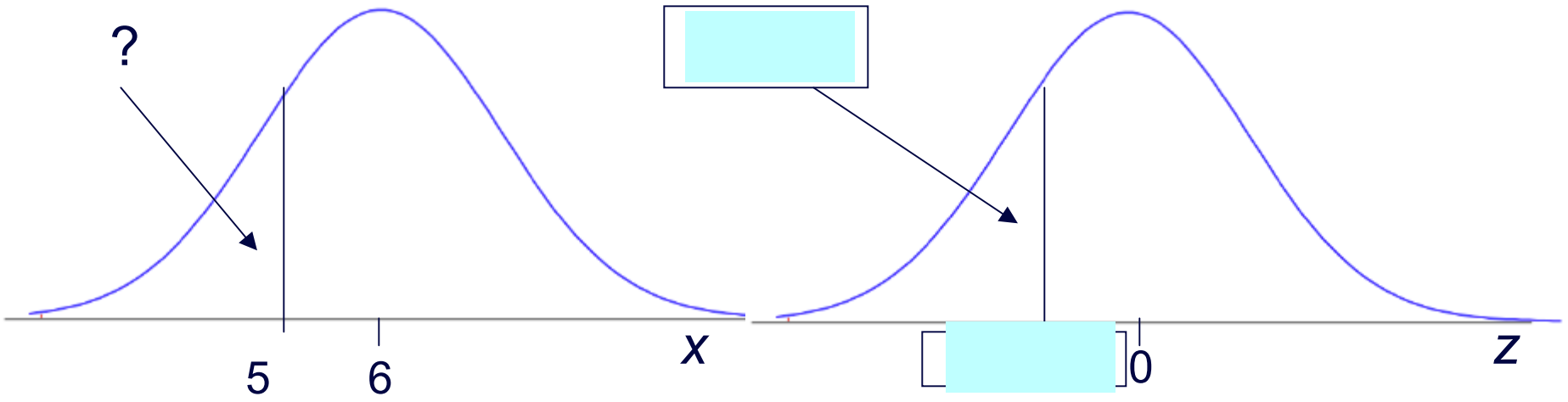


Example: *Normal Exercise #2A*

- **Background**: Sizes *x* have mean 6 inches, sd 1.5 inch.
- **Question:** What % are below 5 inches?
- **Response:**

Table➔

Answer: _____ % are below 5 inches.

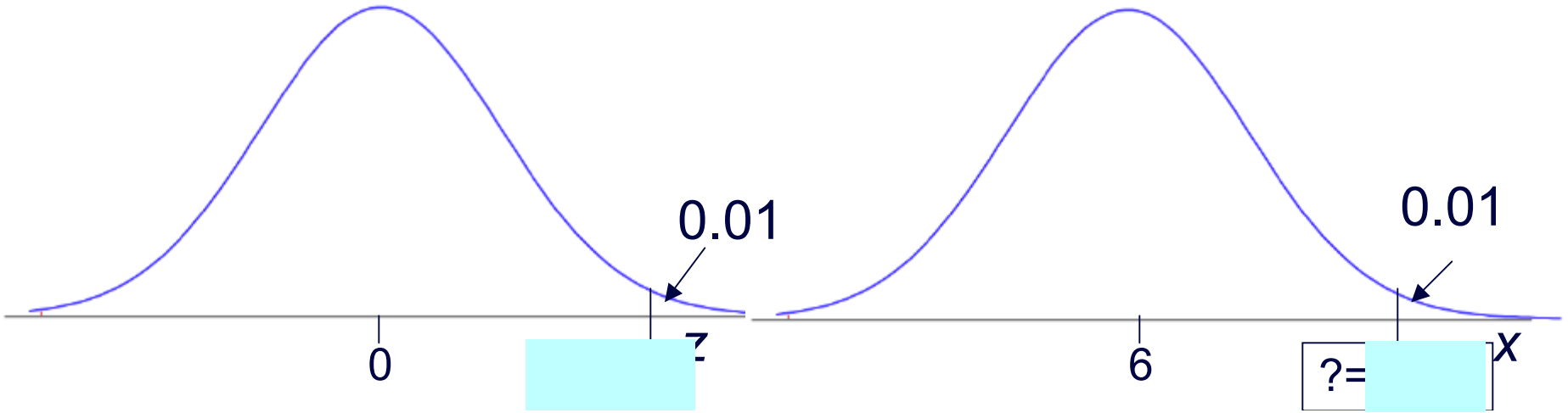


Example: *Normal Exercise #2B*

- **Background**: Sizes *x* have mean 6 inches, sd 1.5 inch.
- **Question:**The tallest 1% are above how many inches?
- **Response:** 0.01 *above*←→

Unstandardize to

Answer: The tallest 1% are above inches.

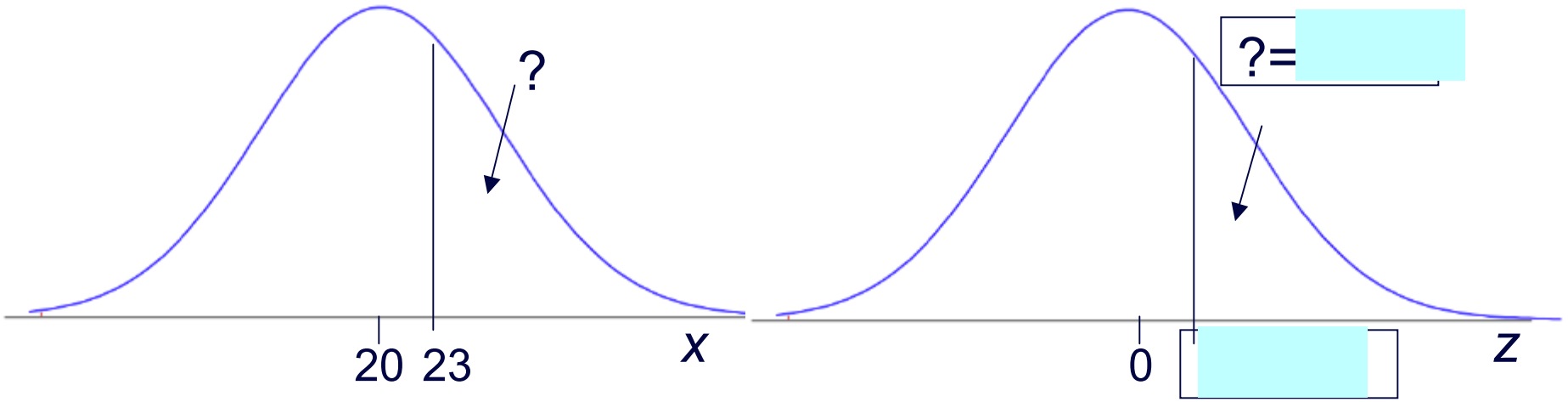


Example: *Normal Exercise #3A*

- **Background**: No. of cigarettes *x* has mean 20, sd 6.
- **Question:** What % are more than 23 cigarettes?
- **Response:** $z =$

Table➔

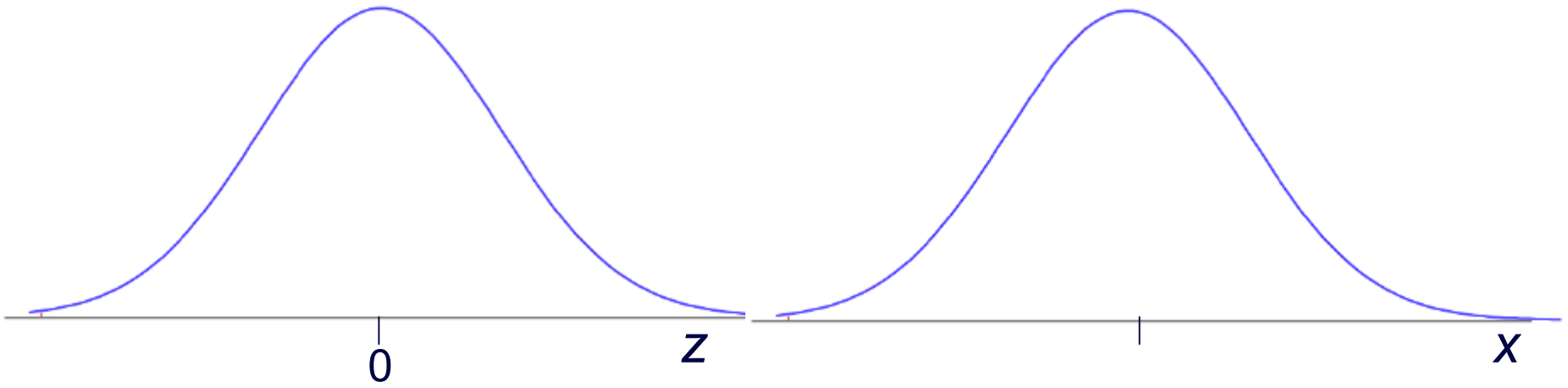
Answer: % are more than 23 cigarettes.



Example: *Normal Exercise #3B*

- **Background**: No. of cigarettes *x* has mean 20, sd 6.
- **Question:** 90% are more than how many cigs?
- **Response:**

Answer: 90% are above _____ cigarettes.

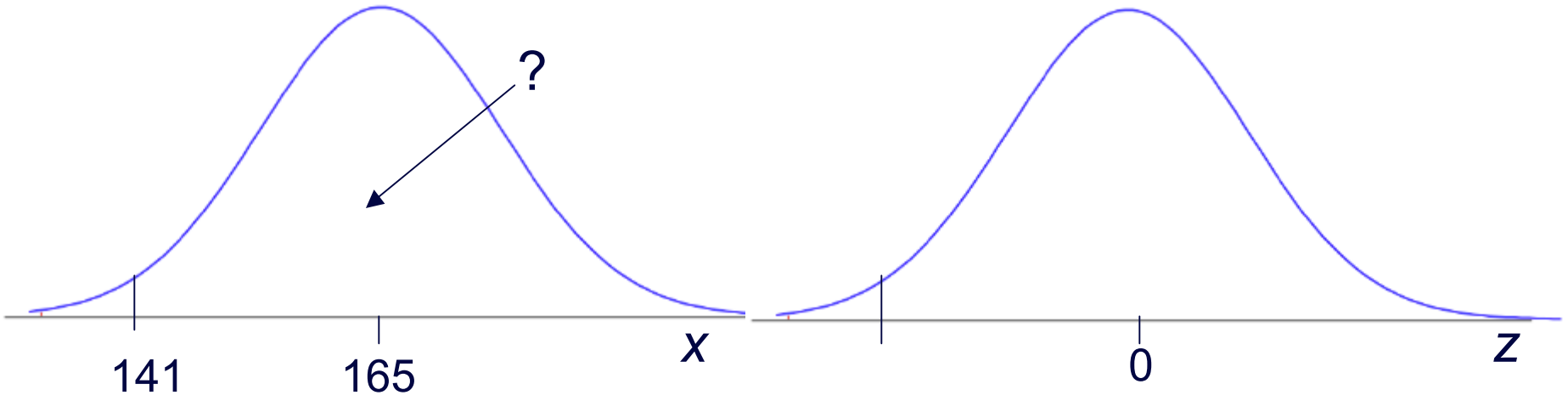


Example: *Normal Exercise #4A*

- **Background**: Wts x have mean 165 lbs, sd 12 lbs.
- **Question:** What % are more than 141 lbs?
- **Response:** $z =$

Table➔

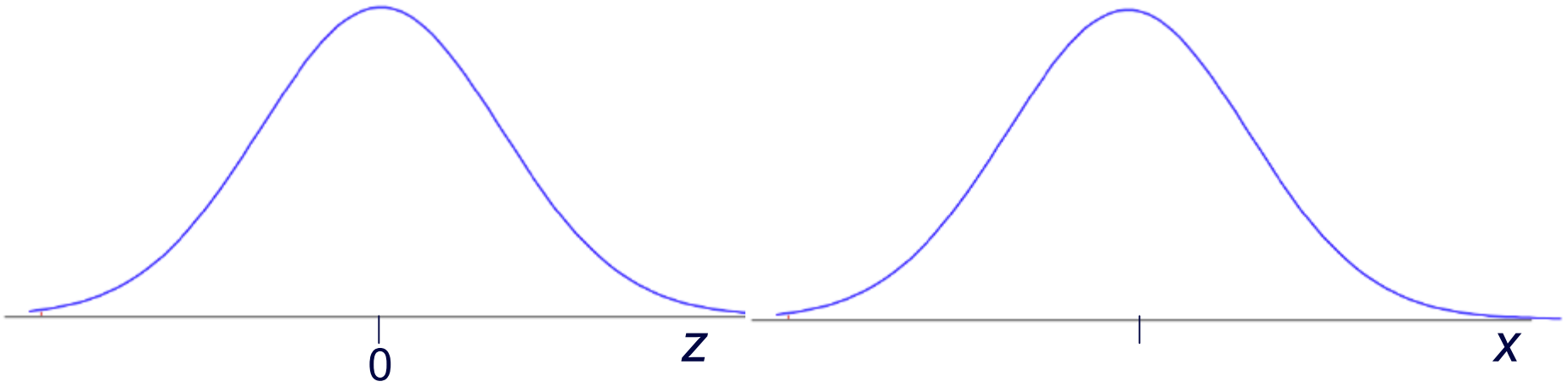
Answer: % are more than 141 lbs.



Example: *Normal Exercise #4B*

- **Background**:Weights *x* have mean 165 lbs, sd 12 lbs.
- **Question:** The lightest 2% are below how many lbs?
- **Response:**

Answer: The lightest 2% are below _____ lbs.



Example: *Normal Exercise #5*

- **Background**: No. of people x has mean 4, sd 1.3.
- **Question:** What % of the time is x between 2 and 6?
- **Response:**

Example: *Normal Exercise #6*

- **Background**: Duration *x* has mean 11 years, sd 2 years.
- **Question:** What % of the time is *x* between 14 and 17?
- **Response:**

Example: *Normal Exercise #7*

- **Background**: Earnings *x* have mean \$30K, sd \$8K.
- **Question:** What % of the time is *x* bet. \$20K and \$22K?
- **Response:**

“Off the Chart”

For extreme negative z values, proportion below is approx. 0, proportion above is approx. 1.

For extreme positive z values, proportion below is approx. 1, proportion above is approx. 0.

Example: *Normal Exercise #8*

- **Background**: Amts. x have mean 300 ml, sd 3 ml.
- **Question:** What % of the time is x …?

(a) <280 ml (b) > 280 ml (c) < 315 ml (d) >315 ml

- **Response:**

(a)

(b)

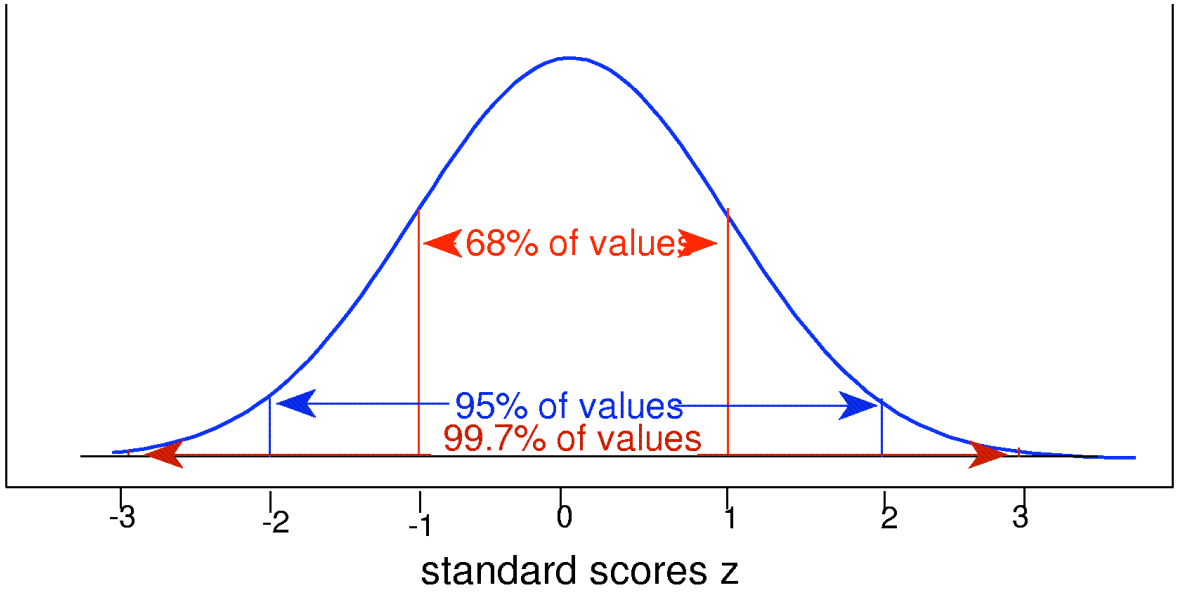
(c)

(d)

Empirical Rule *(Review)*

For any normal curve, approximately

- 68% of values are within 1 sd of mean
- 95% of values are within 2 sds of mean
- 99.7% of values are within 3 sds of mean



Example: *Normal Exercise #9*

- **Background**: Consider Examples 1(b), 4(a).
- **Question:**What does Empirical Rule tell us?
- **Response:**

1(b) mean=100, sd=10.

4(a) mean=165, sd=12.