

$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

This assignment will be collected on Wednesday it will replace related missing homework grades

(Practice = 100, formative attempt 100, but only 50 for NOT turning in formative instead of 40)

Assume mean = 200 and SD = 20 for all problems

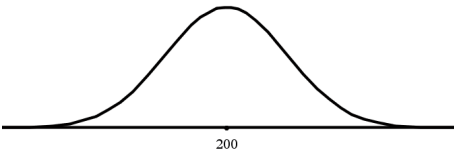
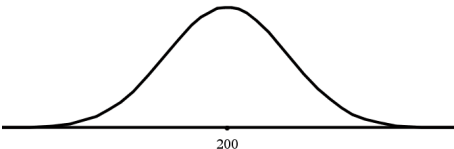
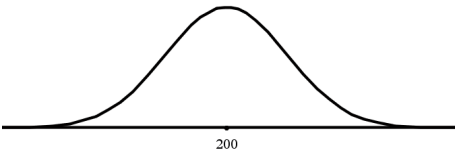
There are ten questions that you need to be able to do for the quiz Friday

Part 1: Determine the related z scores when you know A and B

Part 2: Properly shade normal curve

Part 3: Determine the related probability using z chart directly or indirectly

1. $P(x < A)$
 - a. This problem has three variations
 - i. A less than mean (z will be negative and probability will be less than 0.5000)
 - ii. A equal to mean (z will be equal to 0 and probability will be exactly 0.5000)
 - iii. A greater than mean (z will be positive and probability will be greater than 0.5000)

| | | |
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| <p>$P(x < 165)$ Step 1: find related z score</p> <p>Step 2: look up area in z chart</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x < 200)$ Step 1: You KNOW this is LEFT HALF of normal curve with $z = 0$</p> <p>Step 2: You KNOW this has a probability of 0.5000</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x < 255)$ Step 1: find related z score</p> <p>Step 2: look up area in z chart</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> |
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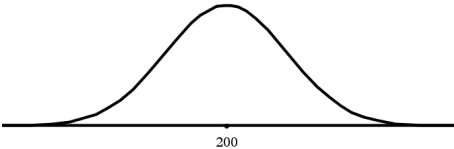
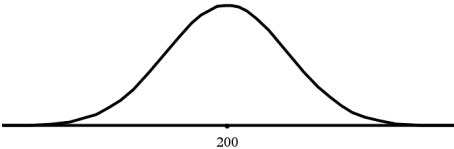
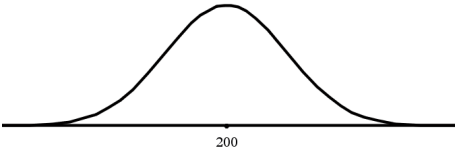
$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

2. $P(x > A)$

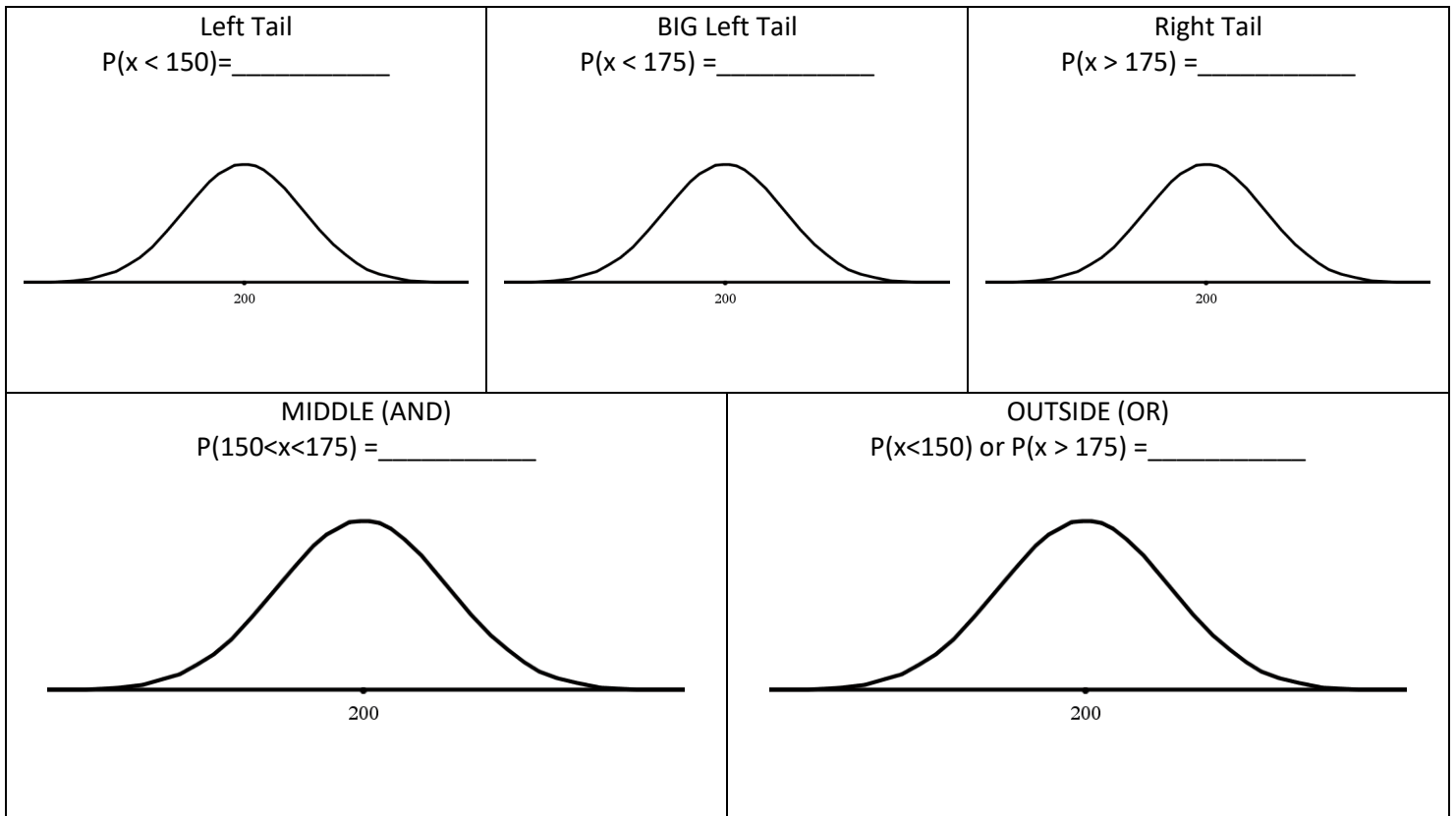
a. This problem requires the use of complement to determine probability

b. This problem has three variations

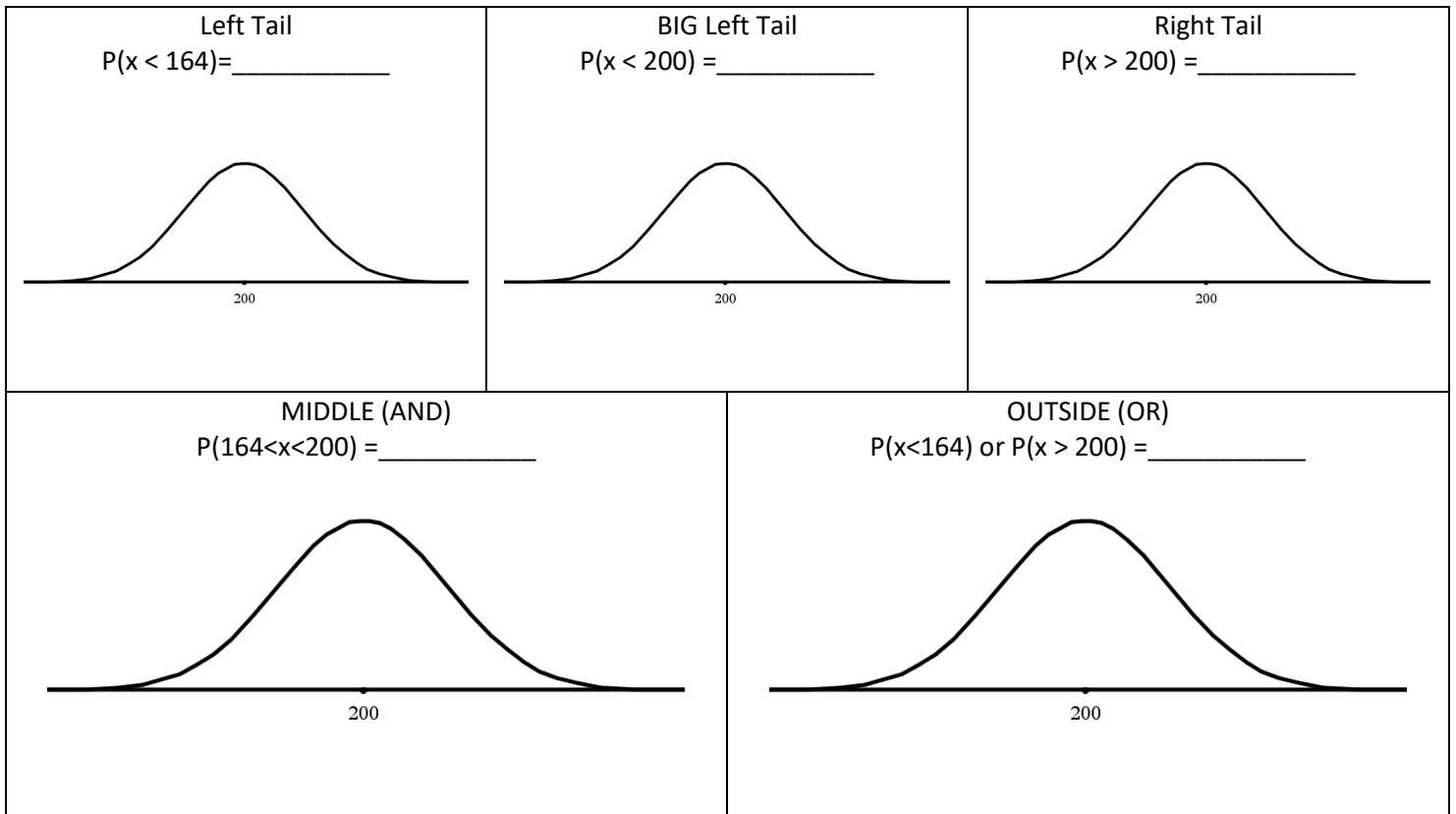
- i. A less than mean (z will be negative and probability will be greater than 0.5000)
- ii. A equal to mean (z will be equal to 0 and probability will be exactly 0.5000)
- iii. A greater than mean (z will be positive and probability will be less than 0.5000)

| | | |
|--|---|---|
| <p>$P(x > 185)$ Step 1: find related z score</p> <p>Step 2: look up area in z chart</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x > 200)$ Step 1: You KNOW this is RIGHT HALF of normal curve with $z = 0$</p> <p>Step 2: You KNOW this has a probability of 0.5000</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x > 218)$ Step 1: find related z score</p> <p>Step 2: look up area in z chart</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> |
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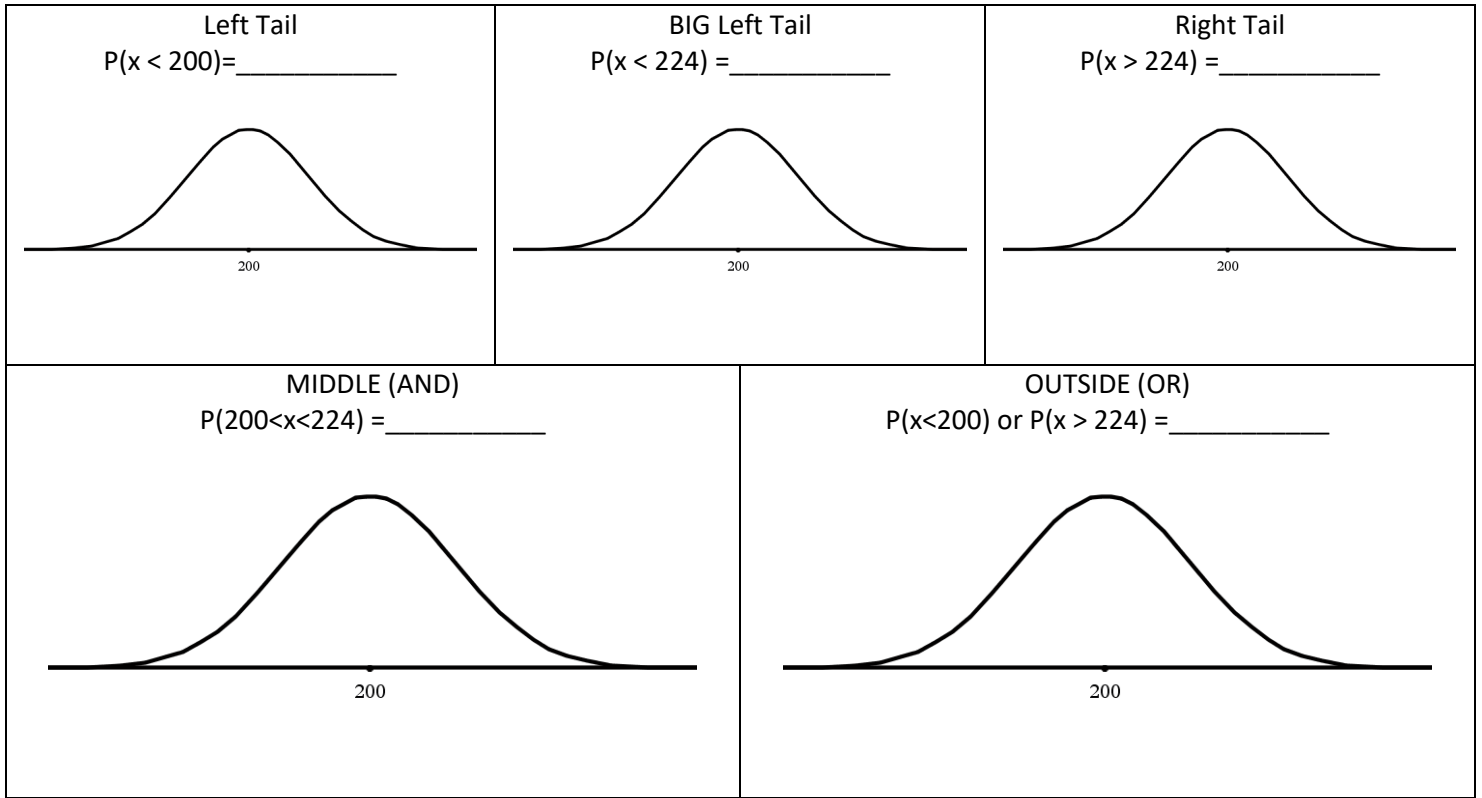
What are the z scores for $x = 150$ and $x = 175$? Z for 150 = _____ Z for 175 = _____



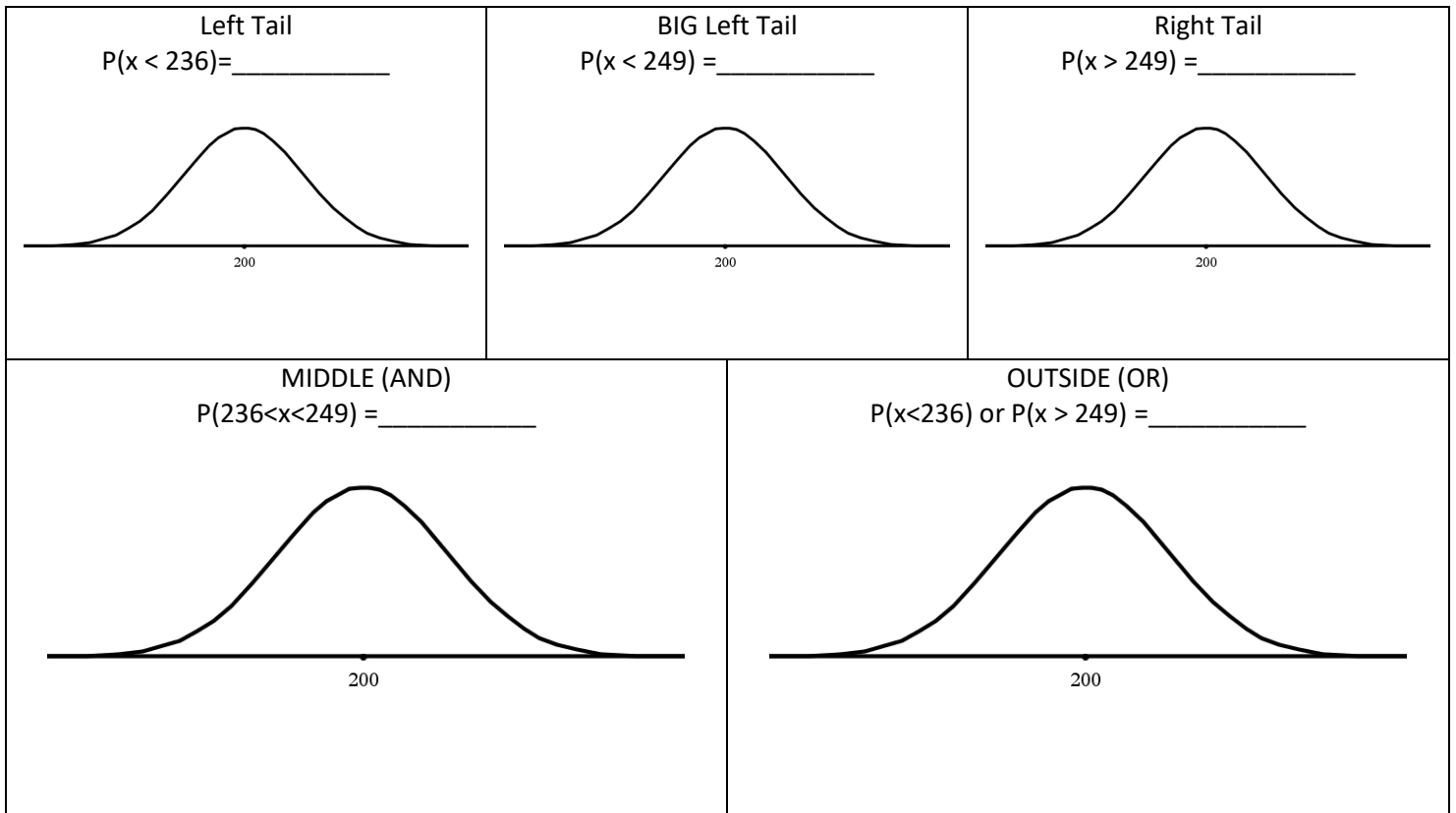
What are the z scores for $x = 164$ and $x = 200$? Z for 164 = _____ Z for 200 = _____



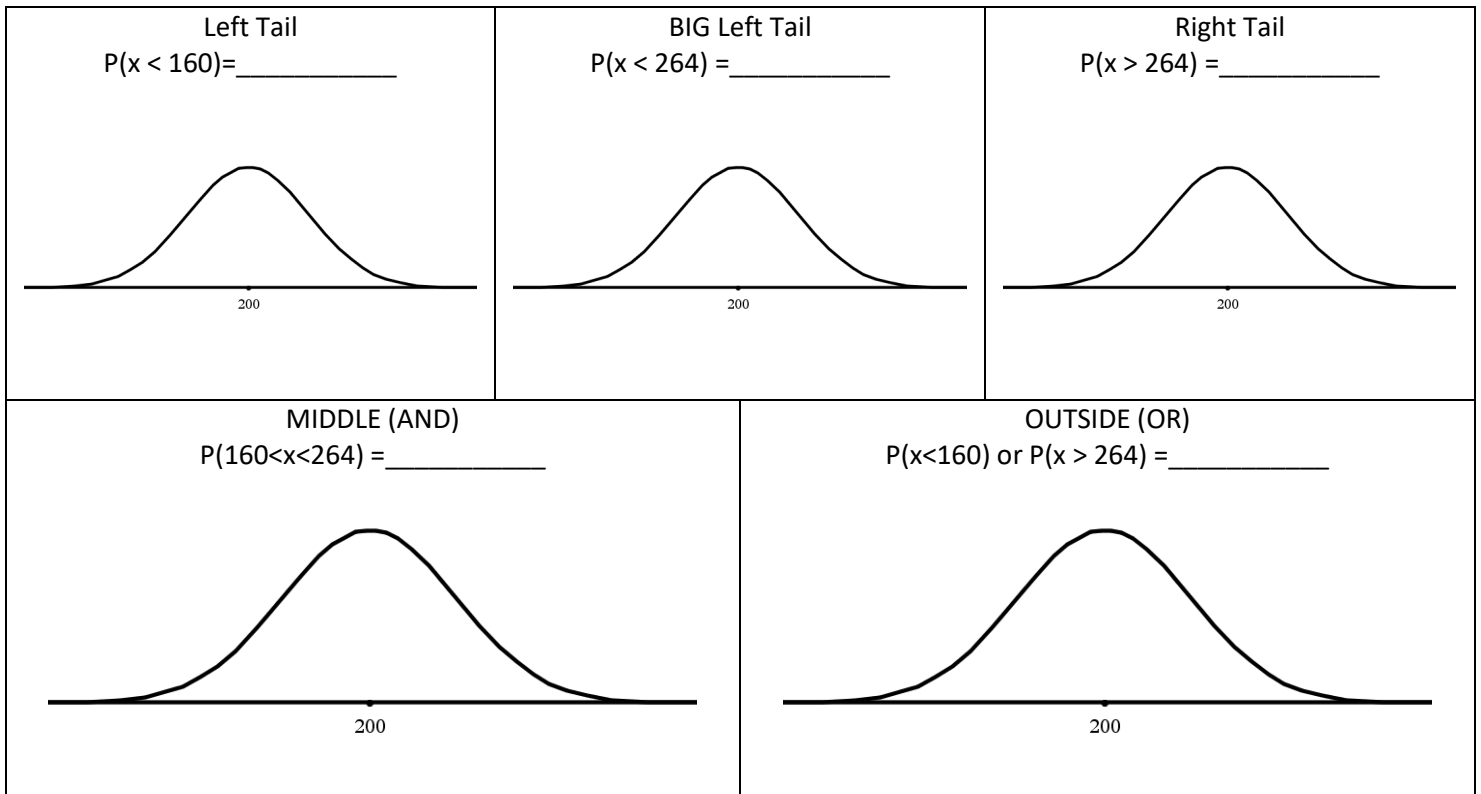
What are the z scores for $x = 200$ and $x = 224$? Z for 200 = _____ Z for 224 = _____



What are the z scores for $x = 236$ and $x = 249$? Z for 236 = _____ Z for 249 = _____



What are the z scores for $x = 160$ and $x = 264$? Z for 160 = _____ Z for 264 = _____



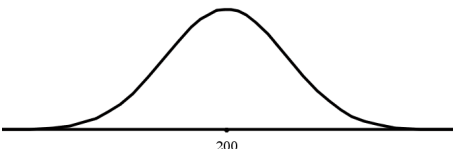
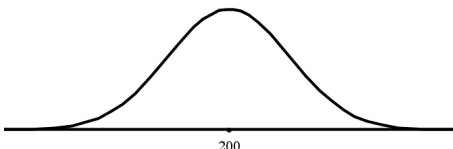
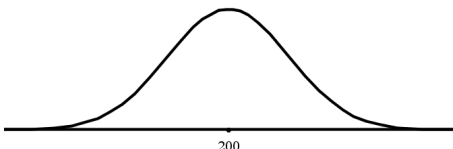
Friday's Quiz will NOT have AND OR with unknown x , but it will have unknown x with left tail and right tail problems

You will have a quiz over JUST AND OR with unknown x next week

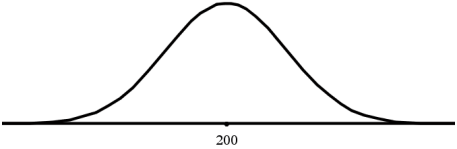
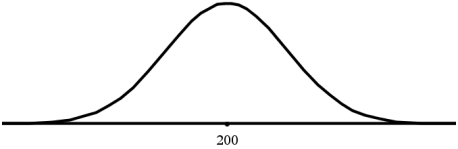
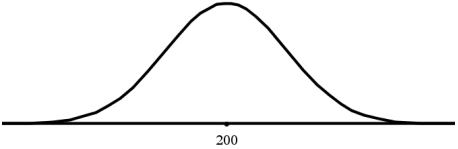
To find an unknown x value

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|--|--|
| <p>Scenario 1: You already know LEFT tail</p> <p>Step 1: look up z score that is closest to given probability</p> <p>Step 2: convert z score to x score using formula</p> <p>Step 3: Label and shade normal curve properly</p> <p>This scenario has three basic cases</p> <ol style="list-style-type: none"> 1. X value is less than mean $P(x < A) < 0.5000$ <ol style="list-style-type: none"> a. This z score should be negative 2. X value is the mean $P(x < A) = 0.5000$ <ol style="list-style-type: none"> a. This z score should be 0 3. X value is greater than mean $P(x < A) > 0.5000$ <ol style="list-style-type: none"> a. This z score should be positive | <p>Scenario 2: You already know RIGHT tail</p> <p>Step 1: look up z score that is closest to THE COMPLEMENT OF given probability</p> <p>This is the LEFT tail</p> <p>Step 2: convert z score to x score using formula</p> <p>Step 3: Label and shade normal curve properly</p> <p>This scenario has three basic cases</p> <ol style="list-style-type: none"> 1. X value is less than mean $P(x > A) > 0.5000$ <ol style="list-style-type: none"> a. This z score should be positive 2. X value is the mean $P(x > A) = 0.5000$ <ol style="list-style-type: none"> a. This z score should be 0 3. X value is greater than mean $P(x > A) < 0.5000$ <ol style="list-style-type: none"> a. This z score should be positive |
|--|--|

$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

| | | |
|--|---|---|
| <p>$P(x < A) = 0.4500$ Step 1: find related z score LOOK UP DIRECTLY IN CHART</p> <p>Step 2: Convert z to x score</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x < A) = 0.5000$ Step 1: You KNOW this is LEFT HALF of normal curve with $z = 0$</p> <p>Step 2: Convert z to x score</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x < A) = 0.6500$ Step 1: find related z score LOOK UP DIRECTLY IN CHART</p> <p>Step 2: Convert z to x score</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> |
|--|---|---|

$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

| | | |
|--|---|---|
| <p>$P(x > A) = 0.3500$ Step 1: find related z score FIND COMPLEMENT OF RIGHT TAIL and LOOK UP IN CHART Complement of RIGHT TAIL _____</p> <p>Step 2: Convert z to x score</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x > A) = 0.5000$ Step 1: You KNOW this is RIGHT HALF of normal curve with $z = 0$</p> <p>Step 2: Convert z to x score</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> | <p>$P(x > A) = 0.8900$ Step 1: find related z score FIND COMPLEMENT OF RIGHT TAIL and LOOK UP IN CHART Complement of RIGHT TAIL _____</p> <p>Step 2: Convert z to x score</p> <p>Step 3 label and shade normal curve</p>  <p>What is the area of the UNSHADED tail for this problem?</p> <p>What is the probability statement for the UNSHADED tail?</p> |
|--|---|---|

**I WOULD STRONGLY SUGGEST
 COMPLETING UP TO THIS POINT FOR
 REVIEW FOR QUIZ BEFORE FRIDAY**

$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean} \quad \text{Assume Mean} = 200 \text{ and } SD = 20 \text{ for all problems}$$

This assignment will be collected on NEXT FRIDAY it will replace related missing homework grades

(Practice = 100, formative attempt 100, but only 50 for NOT turning in formative instead of 40)

4. $P(A < x < B)$

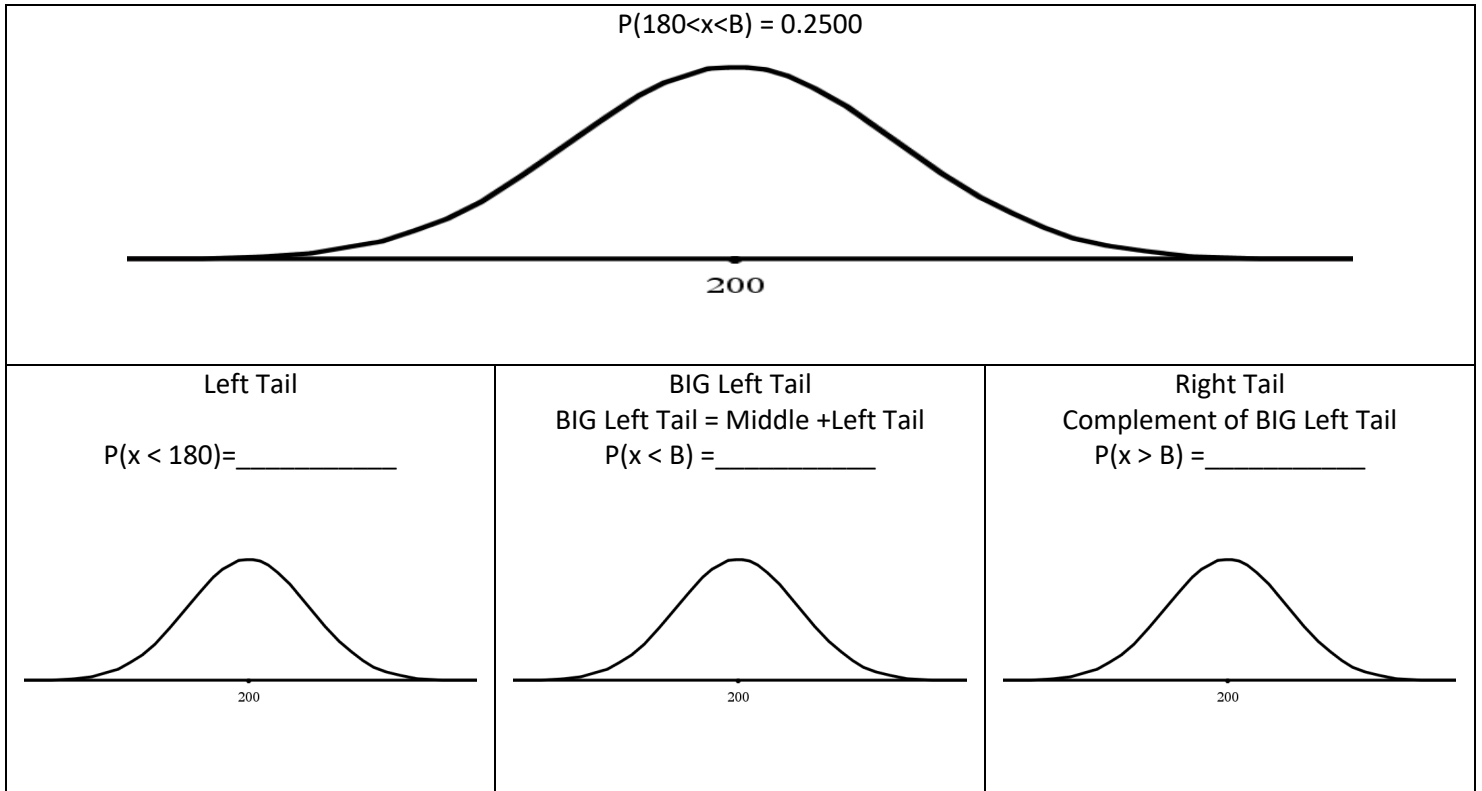
- a. This problem is called an AND probability
- b. The complement to an AND probability is an OR probability
- c. This problem can be solved basically two ways
 - i. Subtract Big Left tail and Left Tail
 - ii. Subtract Left and Right Tail from 1
- d. This problem has five variations
 - i. A and B are less than mean (both z scores are negative and probability will be less than 0.5000)
 - ii. A is less than mean and B = mean (one negative z score and one z score equals 0, probability will be less than 0.5000)
 - iii. A = mean and B greater than mean (one positive z score and one z score equals 0, probability will be less than 0.5000)
 - iv. A and B are greater than mean (both z scores are positive and probability will be less than 0.5000)
 - v. A is less than mean and B is greater than mean (one negative z score and one negative z score , probability will be anything between 0.0001 and 0.9999)

5. $P(x < A)$ or $P(x > B)$

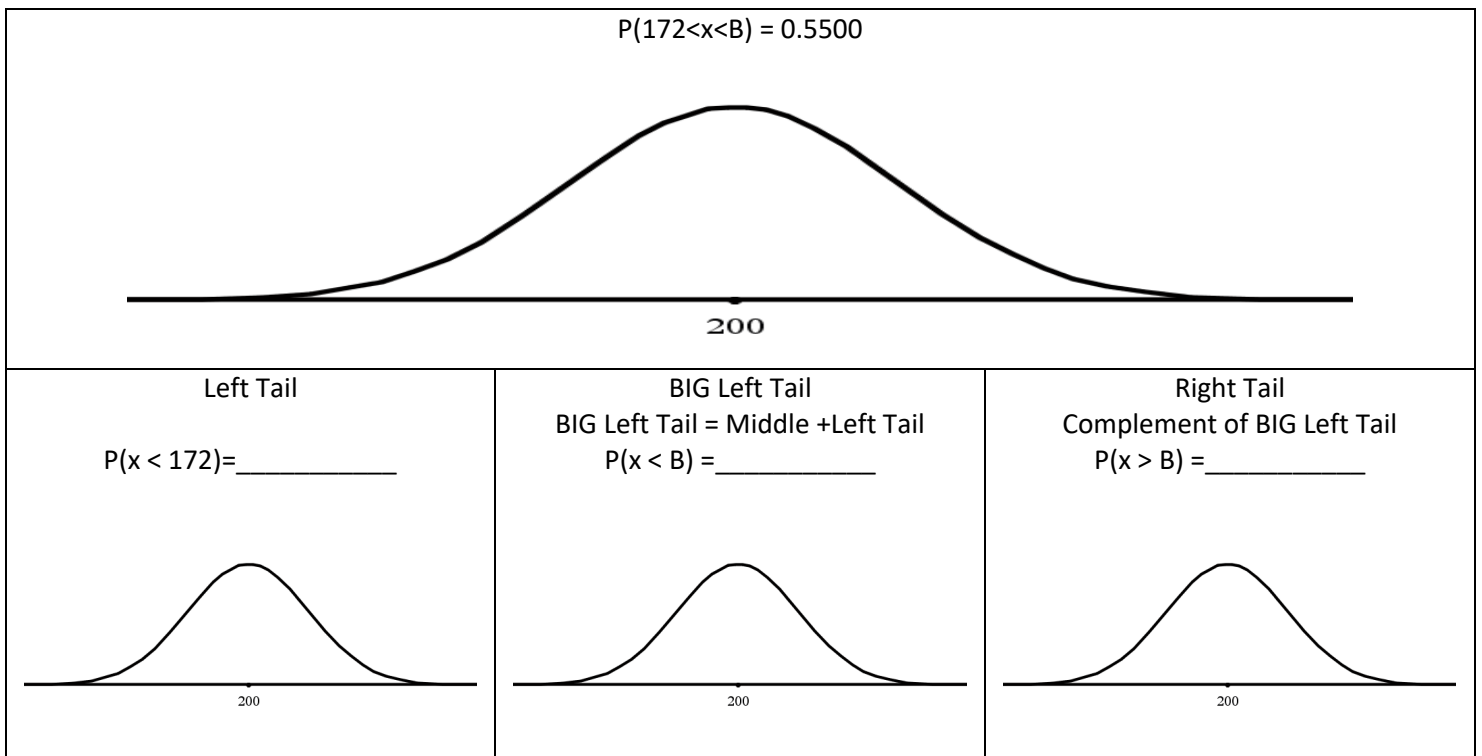
- a. This problem is called an OR probability
- b. This problem can be solved basically two ways
 - i. ADD Left tail and Right Tail
 - ii. Subtract MIDDLE from 1
- c. This problem has five variations
 - i. A and B are less than mean (both z scores are negative and probability will be more than 0.5000)
 - ii. A is less than mean and B = mean (one negative z score and one z score equals 0, probability will be more than 0.5000)
 - iii. A = mean and B greater than mean (one positive z score and one z score equals 0, probability will be more than 0.5000)
 - iv. A and B are greater than mean (both z scores are positive and probability will be more than 0.5000)
 - v. A is less than mean and B is greater than mean (one negative z score and one negative z score , probability will be anything between 0.0001 and 0.9999)

$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

What are the z scores for $x = 180$ and B? Z for 180 = _____ Z for B (this is the BIG Left tail z score) = _____



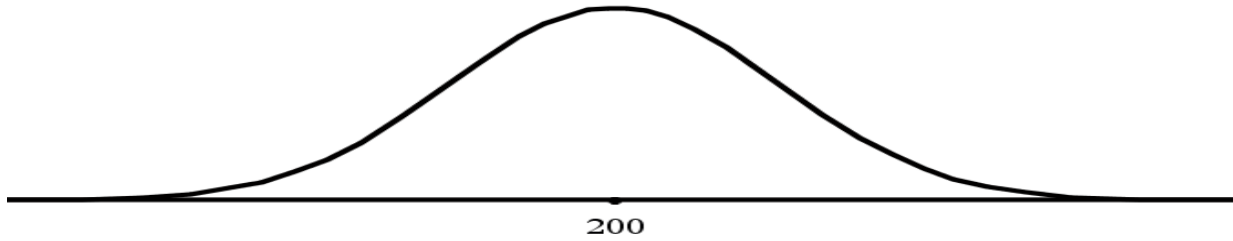
What are the z scores for $x = 172$ and B? Z for 172 = _____ Z for B (this is the BIG Left tail z score) = _____



$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

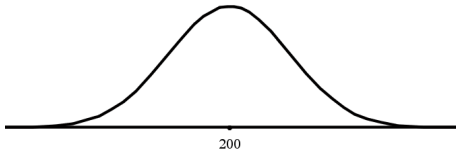
What are the z scores for $x = 195$ and A? Z for 195 = _____ Z for A (this is the Left tail z score) = _____

$$P(A < x < 195) = 0.3800$$



Left Tail

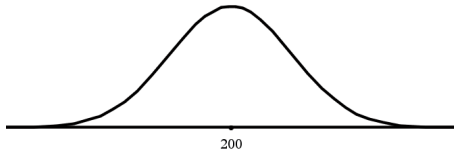
$$P(x < A) = \underline{\hspace{2cm}}$$



BIG Left Tail

BIG Left Tail = Middle + Left Tail

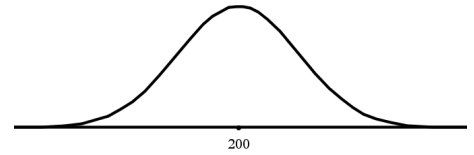
$$P(x < 195) = \underline{\hspace{2cm}}$$



Right Tail

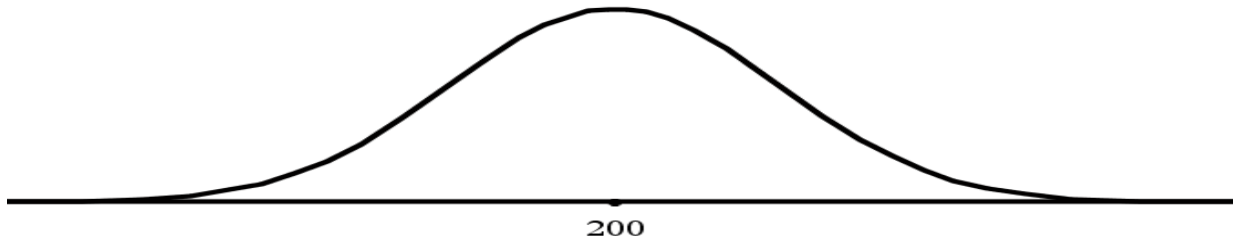
Complement of BIG Left Tail

$$P(x > 195) = \underline{\hspace{2cm}}$$



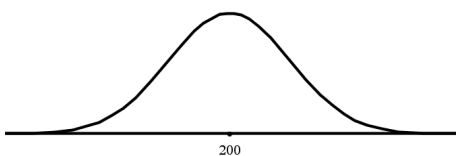
What are the z scores for $x = 225$ and A? Z for 225 = _____ Z for A (this is the Left tail z score) = _____

$$P(A < x < 225) = 0.7400$$



Left Tail

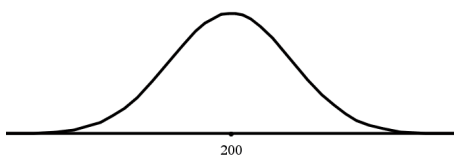
$$P(x < A) = \underline{\hspace{2cm}}$$



BIG Left Tail

BIG Left Tail = Middle + Left Tail

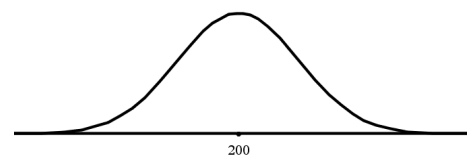
$$P(x < 225) = \underline{\hspace{2cm}}$$



Right Tail

Complement of BIG Left Tail

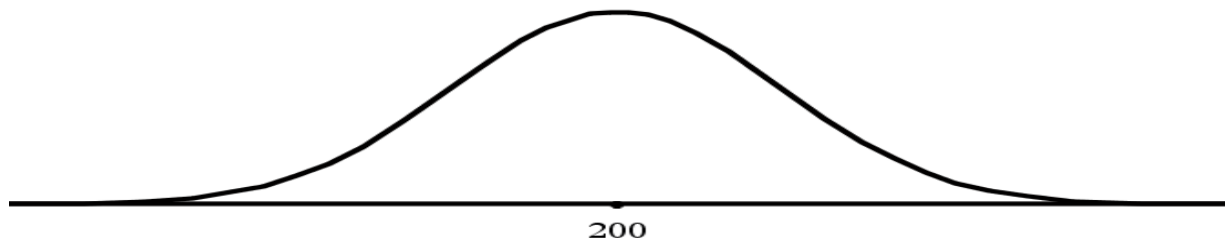
$$P(x > 225) = \underline{\hspace{2cm}}$$



$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

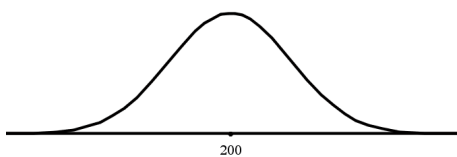
What are the z scores for $x = 210$ and B? Z for 210 = _____ Z for B (this is the BIG Left tail z score) = _____

$$P(210 < x < B) = 0.1800$$



Left Tail

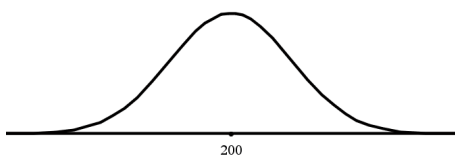
$$P(x < 210) = \underline{\hspace{2cm}}$$



BIG Left Tail

BIG Left Tail = Middle + Left Tail

$$P(x < B) = \underline{\hspace{2cm}}$$



Right Tail

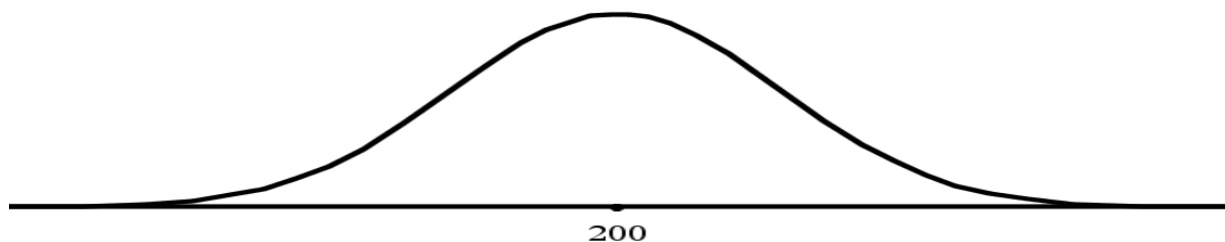
Complement of BIG Left Tail

$$P(x > B) = \underline{\hspace{2cm}}$$



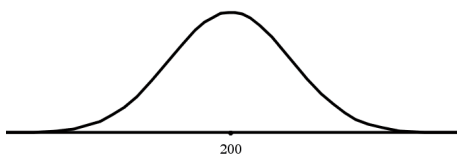
What are the z scores for $x = 230$ and B? Z for 230 = _____ Z for B (this is the BIG Left tail z score) = _____

$$P(230 < x < B) = 0.0400$$



Left Tail

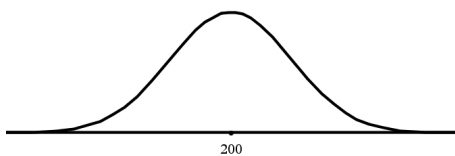
$$P(x < 230) = \underline{\hspace{2cm}}$$



BIG Left Tail

BIG Left Tail = Middle + Left Tail

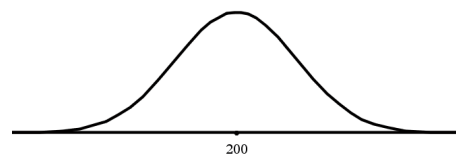
$$P(x < B) = \underline{\hspace{2cm}}$$



Right Tail

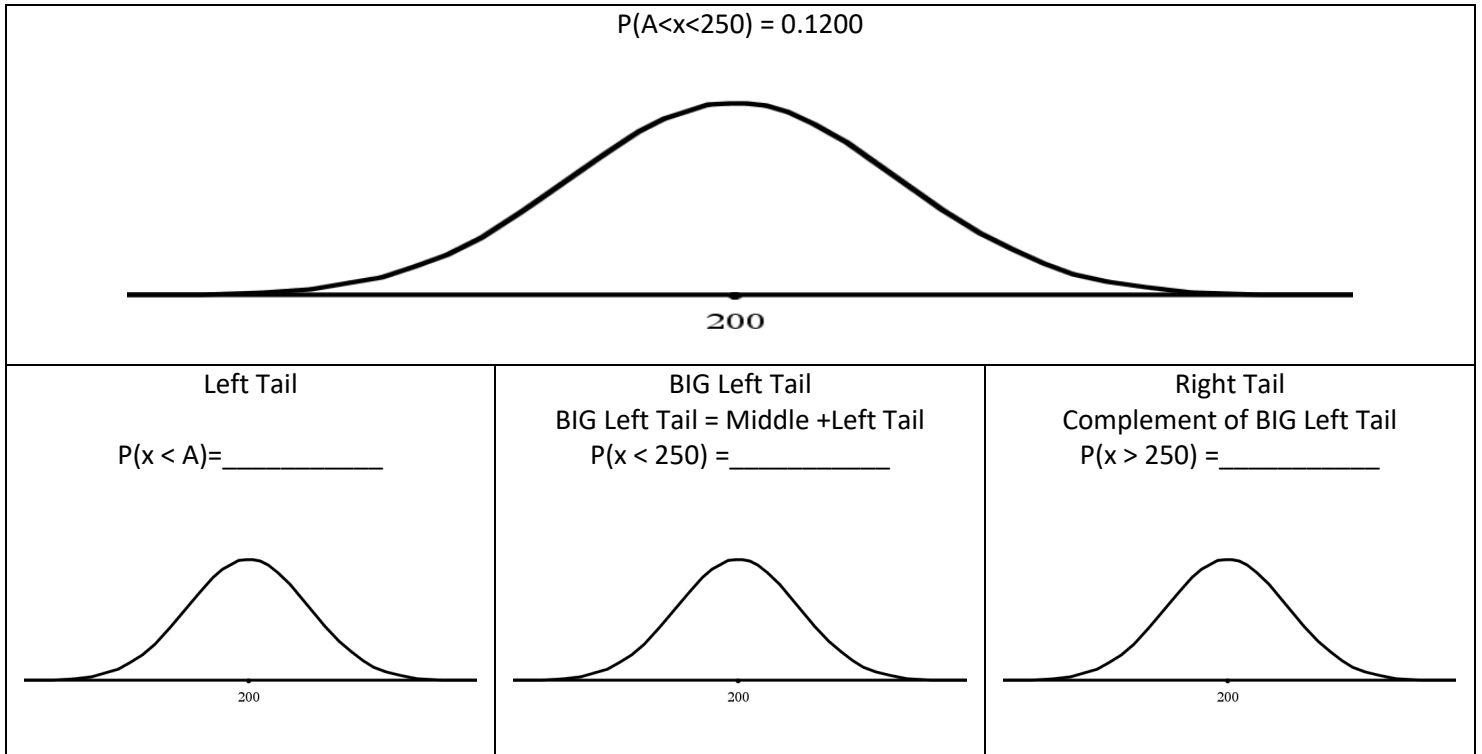
Complement of BIG Left Tail

$$P(x > B) = \underline{\hspace{2cm}}$$

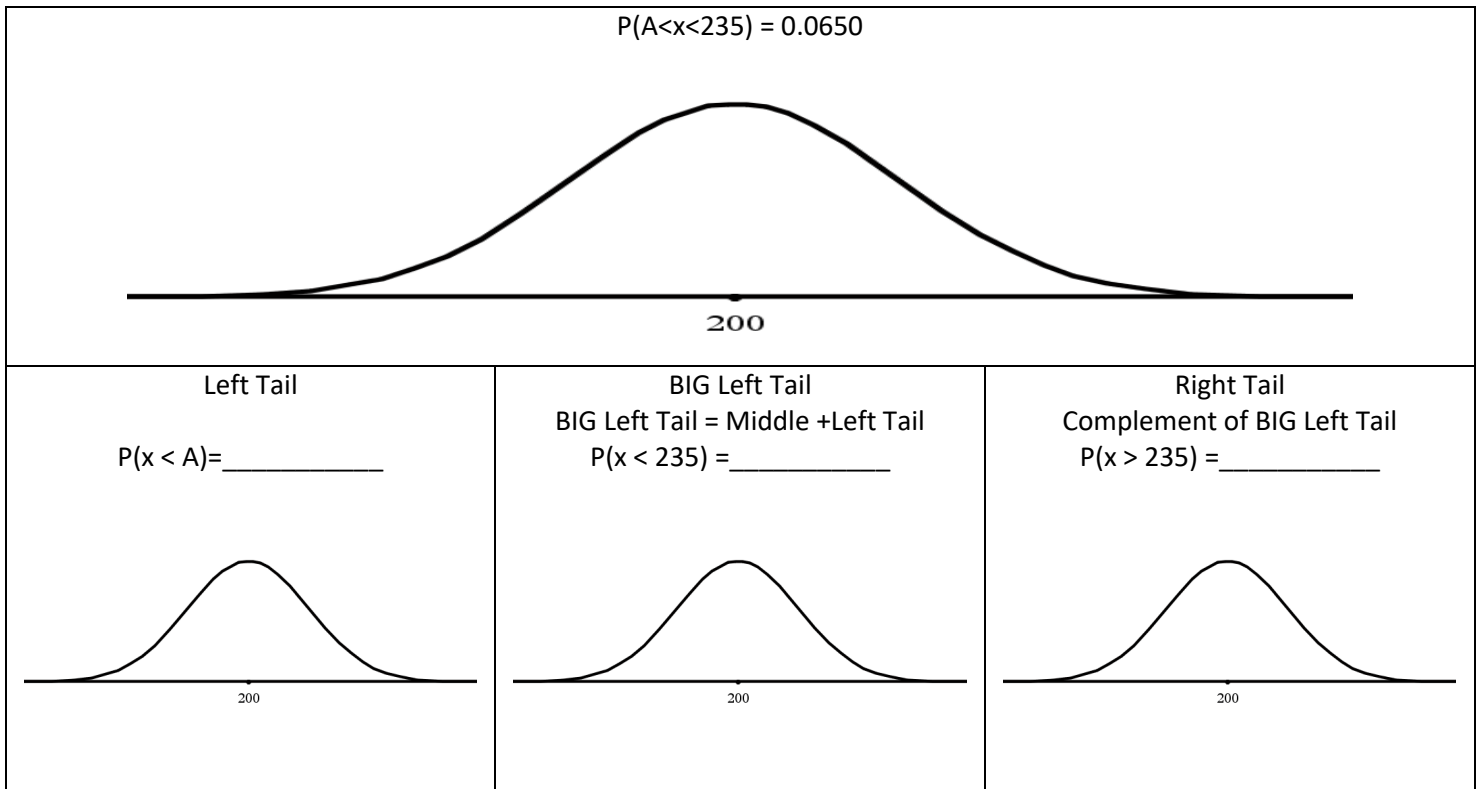


$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

What are the z scores for $x = 250$ and A ? Z for $250 =$ _____ Z for A (this is the Left tail z score) = _____

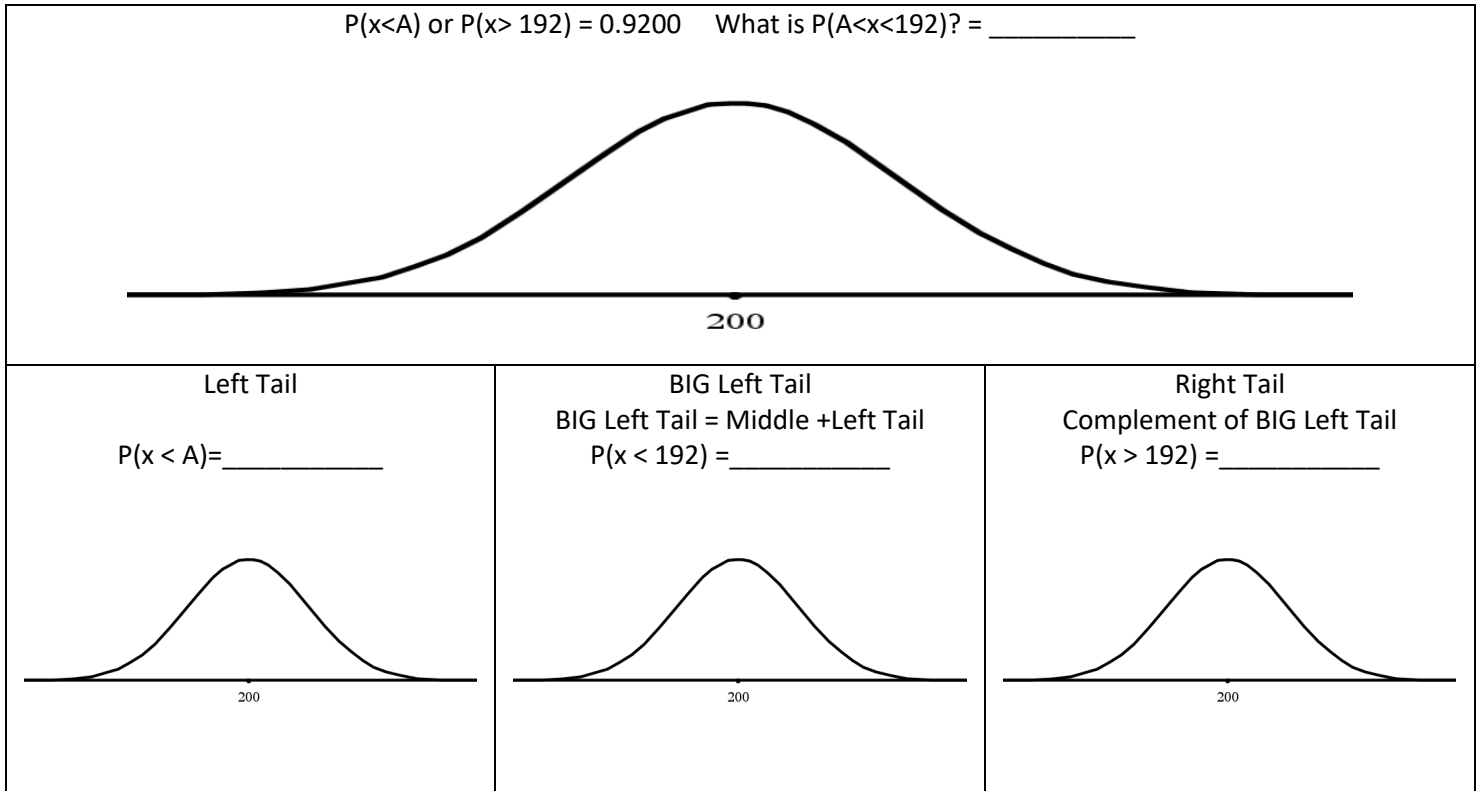


What are the z scores for $x = 235$ and A ? Z for $235 =$ _____ Z for A (this is the Left tail z score) = _____

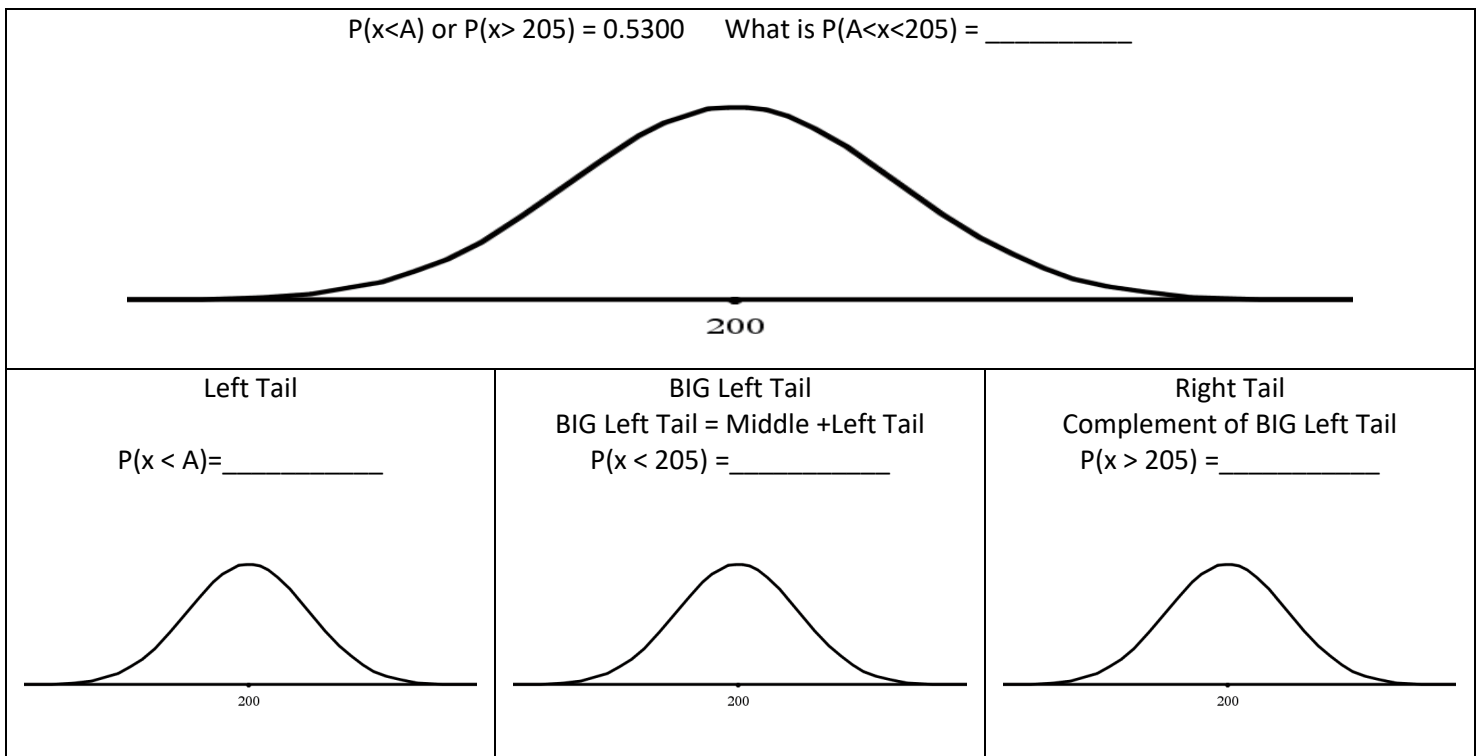


$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

What are the z scores for $x = 192$ and A? Z for 192 = _____ Z for A (this is the Left tail z score) = _____

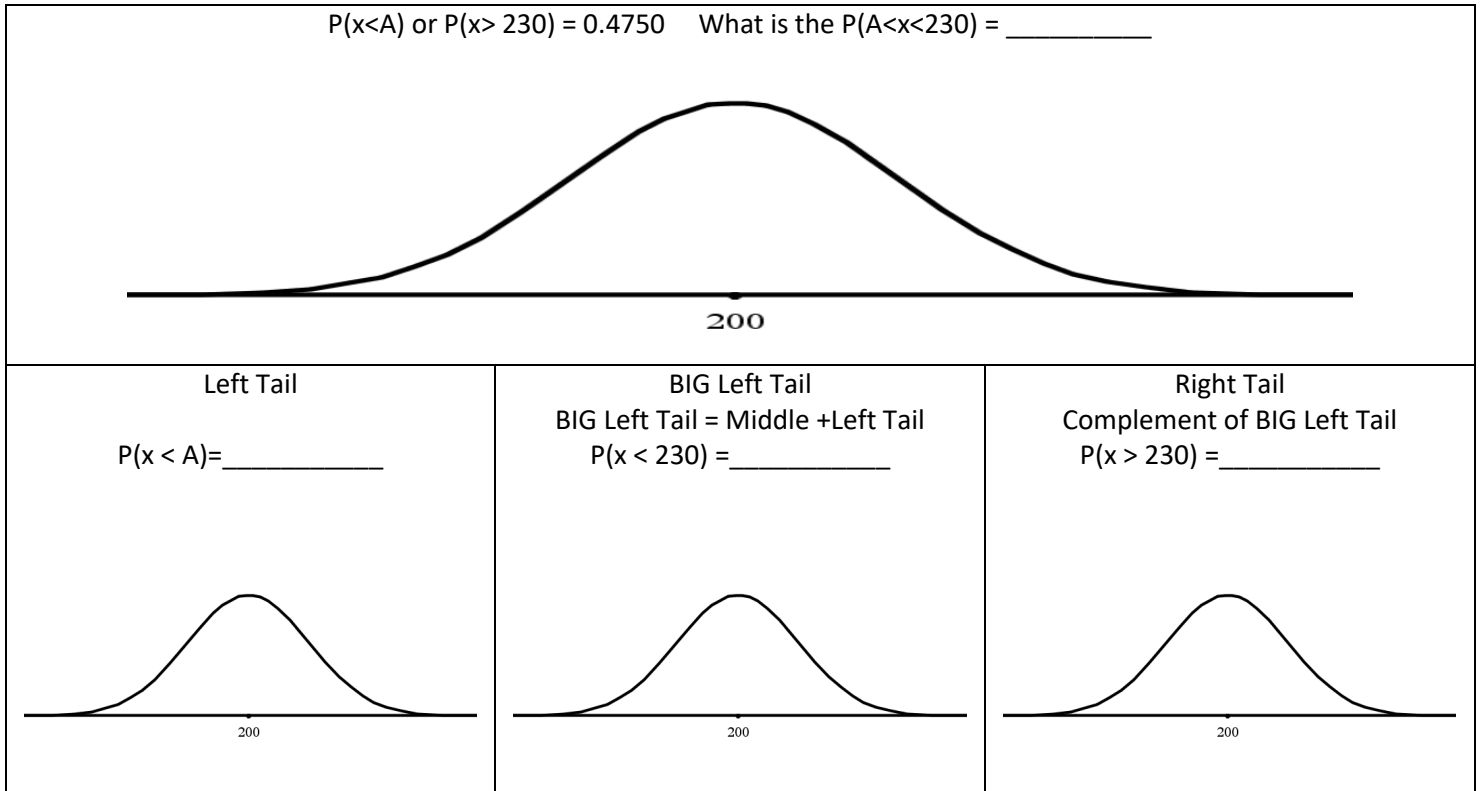


What are the z scores for $x = 205$ and A? Z for 205 = _____ Z for A (this is the Left tail z score) = _____

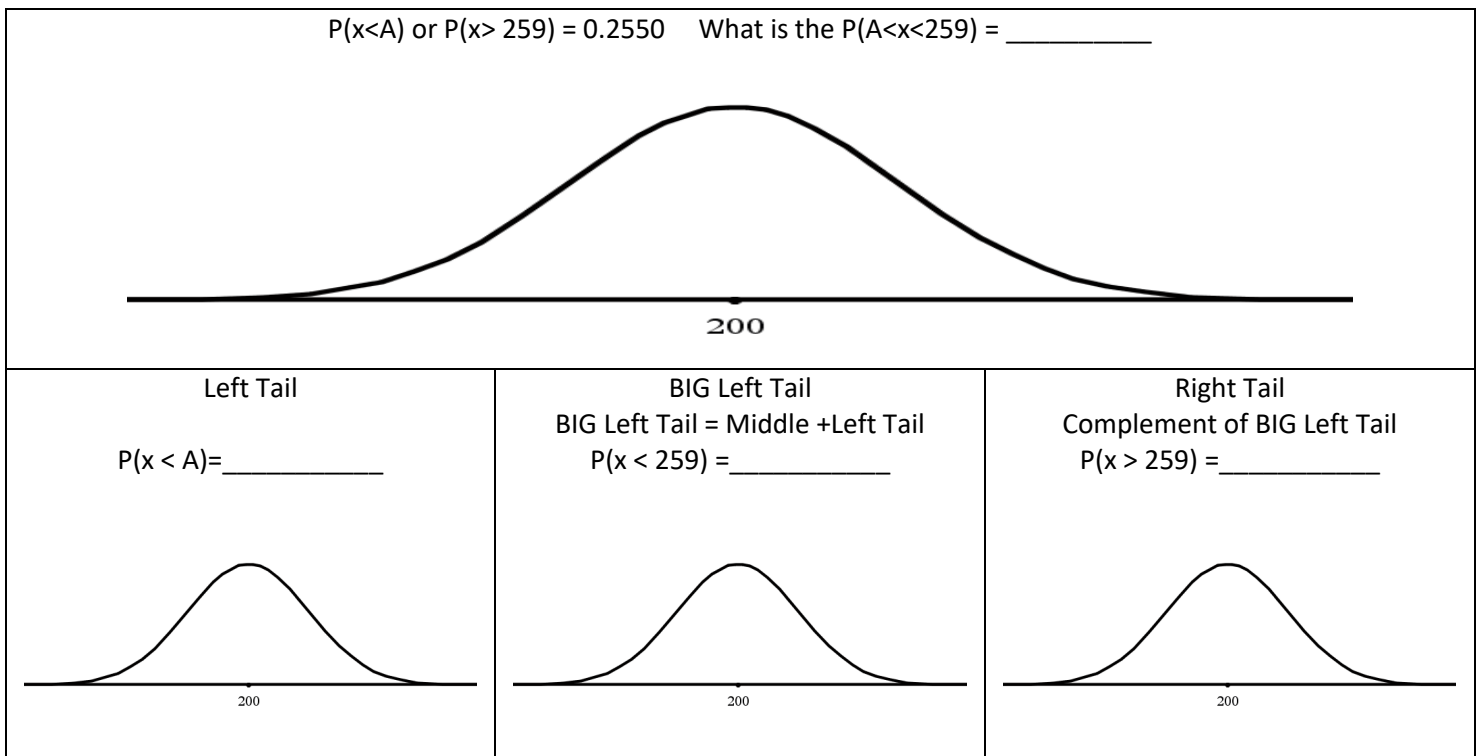


$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

What are the z scores for $x = 230$ and A? Z for 180 = _____ Z for A (this is the Left tail z score) = _____



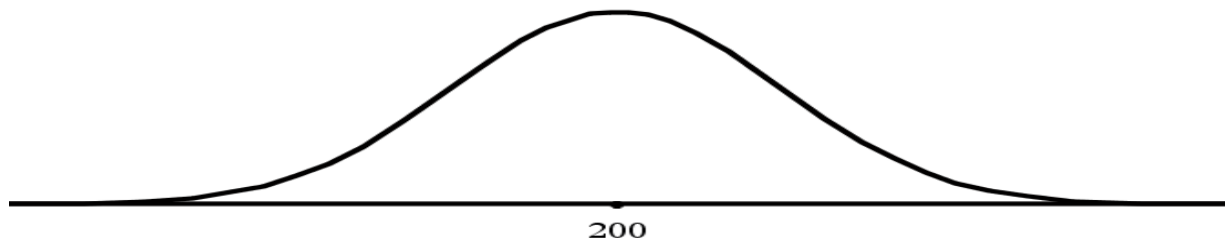
What are the z scores for $x = 259$ and A? Z for 259 = _____ Z for A (this is the Left tail z score) = _____



$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

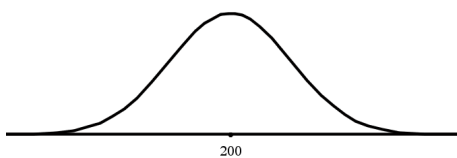
What are the z scores for $x = 168$ and B? Z for 168 = _____ Z for B (this is the BIG Left tail z score) = _____

$P(x < 168)$ or $P(x > B) = 0.8850$ What is $P(168 < x < B) =$ _____



Left Tail

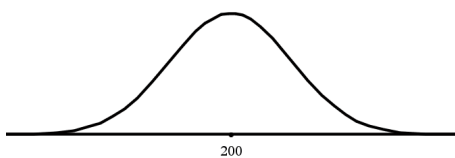
$P(x < 168) =$ _____



BIG Left Tail

BIG Left Tail = Middle + Left Tail

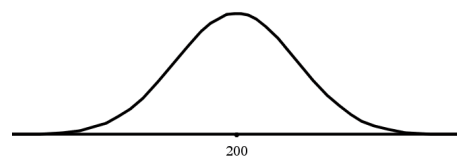
$P(x < B) =$ _____



Right Tail

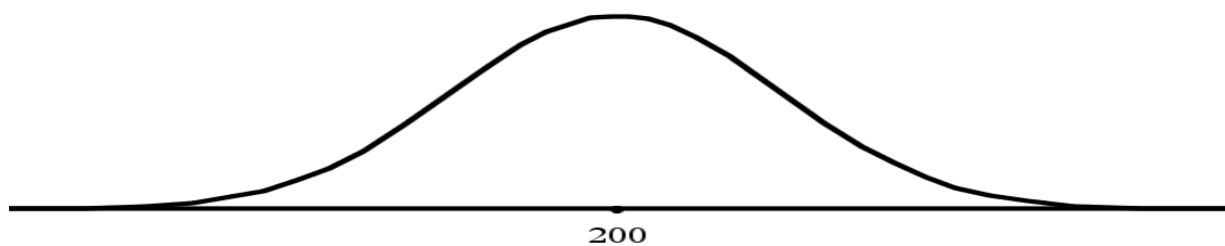
Complement of BIG Left Tail

$P(x > B) =$ _____



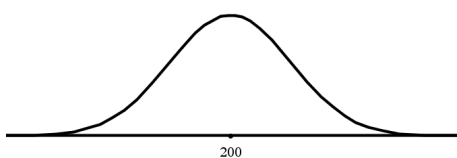
What are the z scores for $x = 173$ and B? Z for 173 = _____ Z for B (this is the BIG Left tail z score) = _____

$P(x < 173)$ or $P(x > B) = 0.2450$ What is $P(173 < x < B) =$ _____



Left Tail

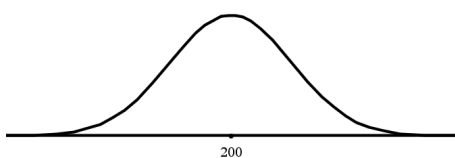
$P(x < 173) =$ _____



BIG Left Tail

BIG Left Tail = Middle + Left Tail

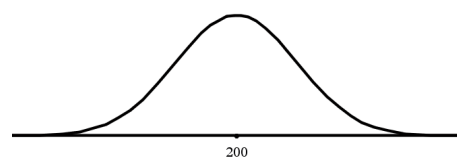
$P(x < B) =$ _____



Right Tail

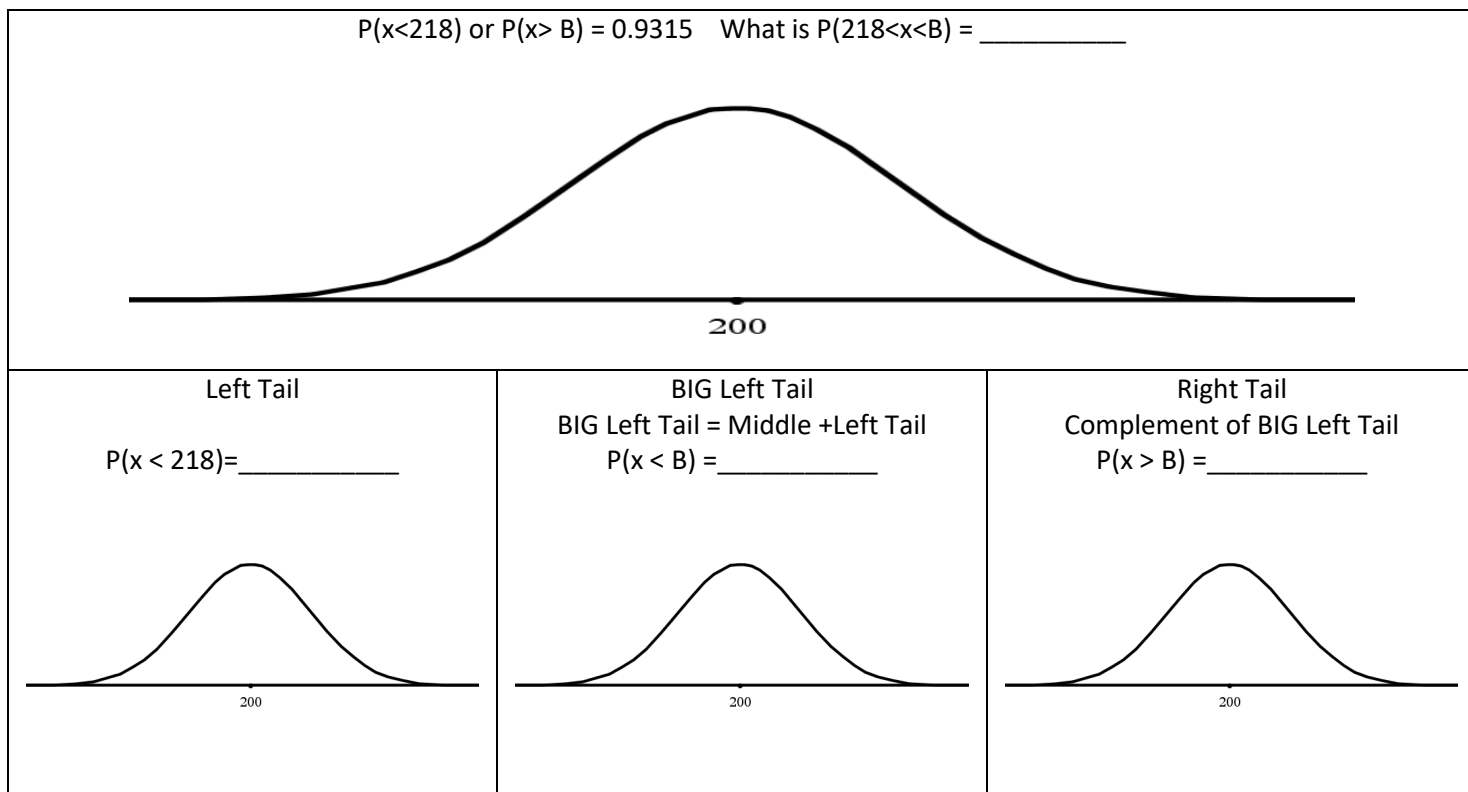
Complement of BIG Left Tail

$P(x > B) =$ _____



$$Z = \frac{x - \text{mean}}{SD} \quad X = Z(SD) + \text{mean}$$

What are the z scores for $x = 218$ and B? Z for 218 = _____ Z for B (this is the BIG Left tail z score) = _____



What are the z scores for $x = 222$ and A? Z for 222 = _____ Z for A (this is the Left tail z score) = _____

