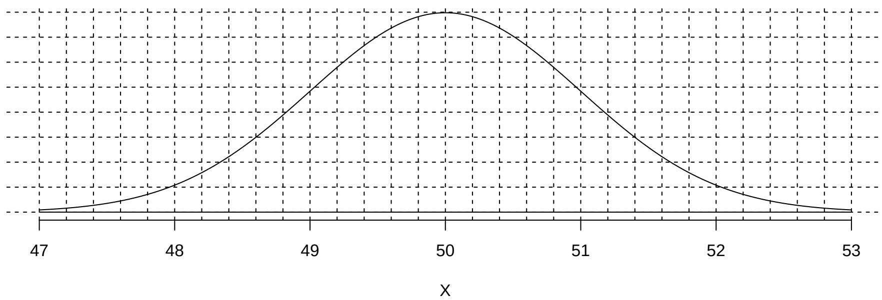
1. **Problem**
Let X be a normal random variable with mean $\mu = 50$ and standard deviation $\sigma = 1$.

$$X \sim \mathcal{N}(50, 1)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



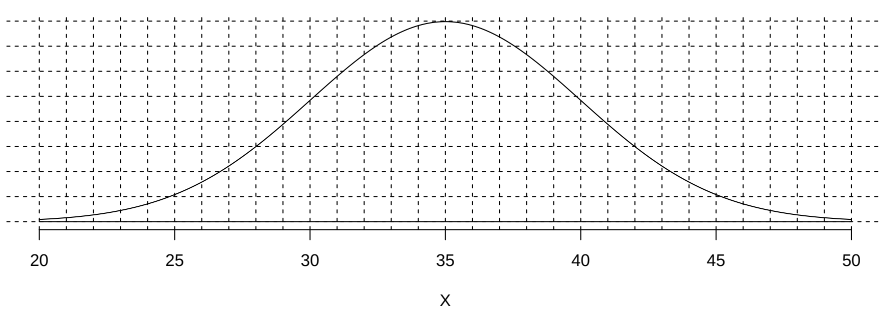
(a) Estimate $P(X < 49)$ by shading and counting.

(b) Determine $P(Z < 49)$ by using the z-table.

2. **Problem**
Let X be a normal random variable with mean $\mu = 35$ and standard deviation $\sigma = 5$.

$$X \sim \mathcal{N}(35, 5)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



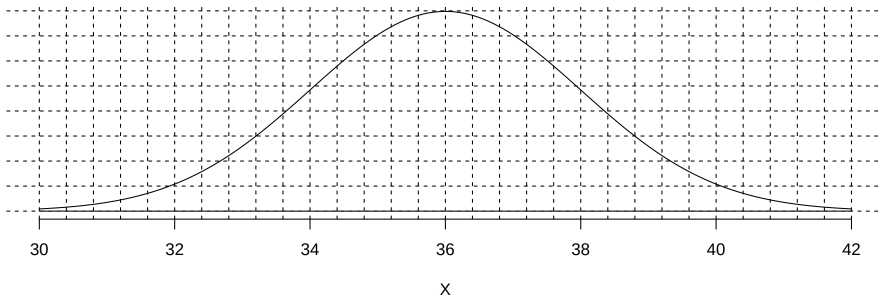
(a) Estimate $P(X > 38)$ by shading and counting.

(b) Determine $P(Z > 38)$ by using the z-table.

3. **Problem**
   Let X be a normal random variable with mean μ = 36 and standard deviation σ = 2.

$$X \sim \mathcal{N}(36, 2)$$

   The figure below shows the density of random variable X. Each grid square represents 1% of probability.



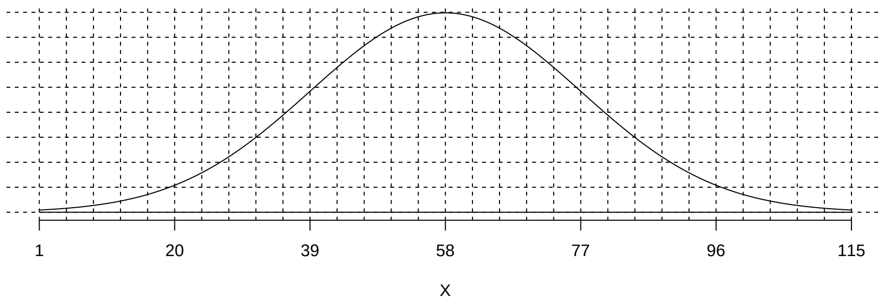
   (a) Estimate $P(|X - \mu| < 2.8)$ by shading and counting.

   (b) Determine $P(|X - \mu| < 2.8)$ by using the z-table.

4. **Problem**
   Let X be a normal random variable with mean μ = 58 and standard deviation σ = 19.

$$X \sim \mathcal{N}(58, 19)$$

   The figure below shows the density of random variable X. Each grid square represents 1% of probability.



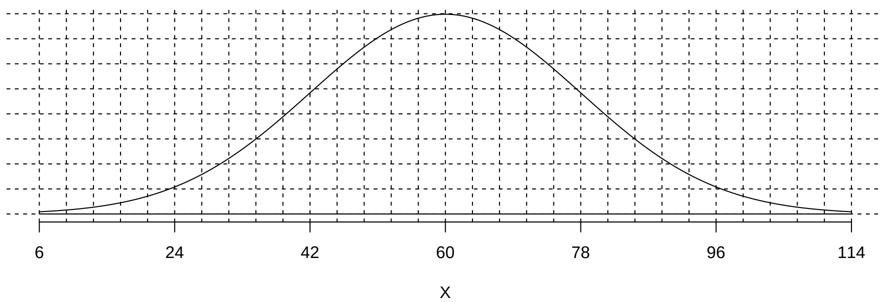
   (a) Estimate $P(|X - \mu| > 3.8)$ by shading and counting.

   (b) Determine $P(|X - \mu| > 3.8)$ by using the z-table.

5. **Problem**
   Let X be a normal random variable with mean $\mu = 60$ and standard deviation $\sigma = 18$.

$$X \sim \mathcal{N}(60, 18)$$

   The figure below shows the density of random variable X. Each grid square represents 1% of probability.



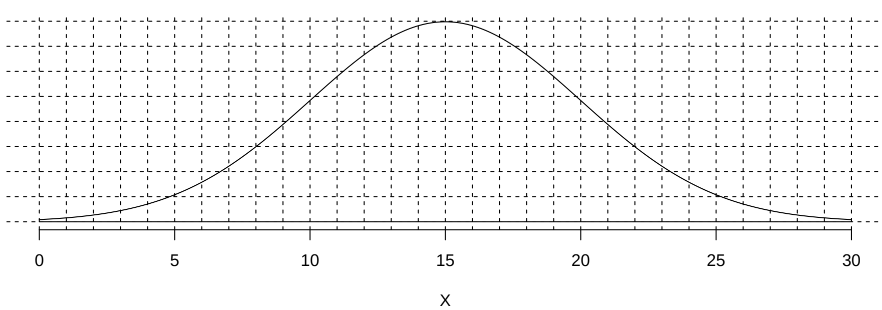
   (a) Estimate x such that $P(X < x) = 0.88$ by shading and counting.

   (b) Determine x such that $P(X < x) = 0.88$ by using the z-table.

6. **Problem**
   Let X be a normal random variable with mean $\mu = 15$ and standard deviation $\sigma = 5$.

$$X \sim \mathcal{N}(15, 5)$$

   The figure below shows the density of random variable X. Each grid square represents 1% of probability.



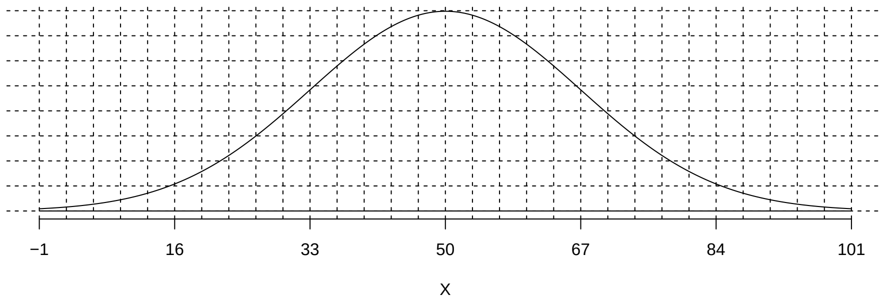
   (a) Estimate x such that $P(X > x) = 0.27$ by shading and counting.

   (b) Determine z such that $P(X > x) = 0.27$ by using the z-table.

7. **Problem**
   Let X be a normal random variable with mean $\mu = 50$ and standard deviation $\sigma = 17$.

$$X \sim \mathcal{N}(50, 17)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



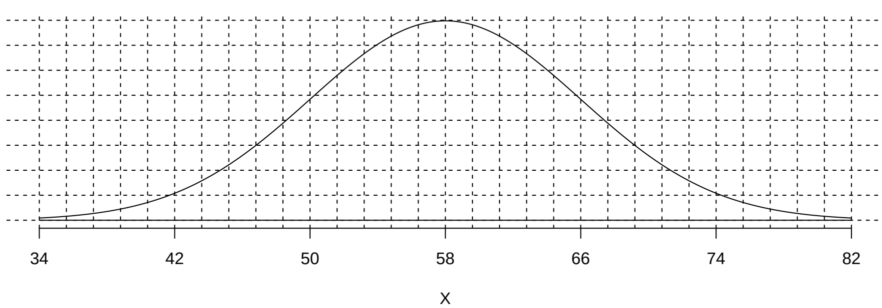
(a) Estimate a such that $P(|X - \mu| < a) = 0.31$ by shading and counting.

(b) Determine a such that $P(|X - \mu| < a) = 0.31$ by using the z-table.

8. **Problem**
   Let X be a normal random variable with mean $\mu = 58$ and standard deviation $\sigma = 8$.

$$X \sim \mathcal{N}(58, 8)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



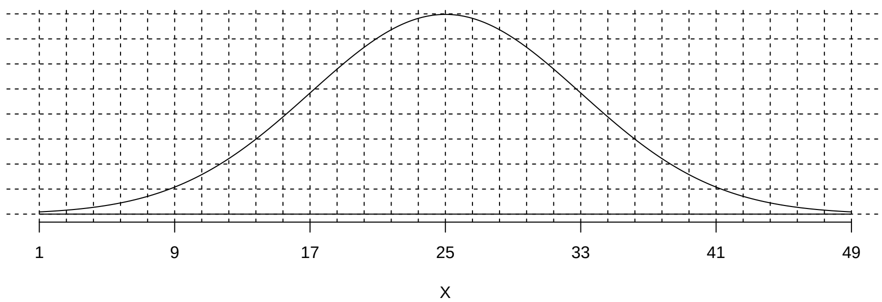
(a) Estimate a such that $P(|X - \mu| > a) = 0.23$ by shading and counting.

(b) Determine z such that $P(|X - \mu| > a) = 0.23$ by using the z-table.

9. **Problem**
   Let X be a normal random variable with mean $\mu = 25$ and standard deviation $\sigma = 8$.

$$X \sim \mathcal{N}(25, 8)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



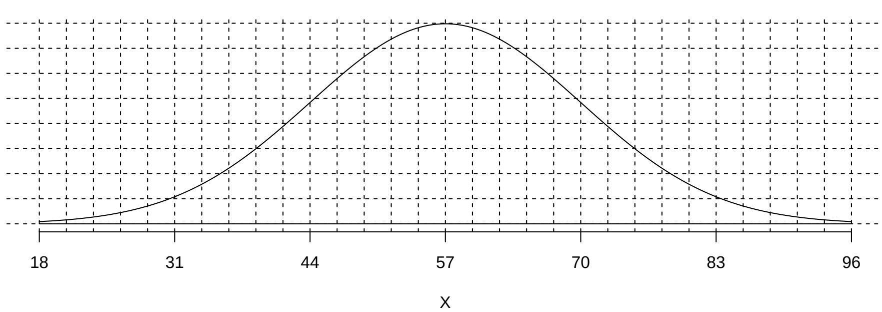
(a) Estimate x such that $P(X < x) = 0.21$ by shading and counting.

(b) Determine x such that $P(X < x) = 0.21$ by using the z-table.

10. **Problem**
    Let X be a normal random variable with mean $\mu = 57$ and standard deviation $\sigma = 13$.

$$X \sim \mathcal{N}(57, 13)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



(a) Estimate $P(X > 51.8)$ by shading and counting.

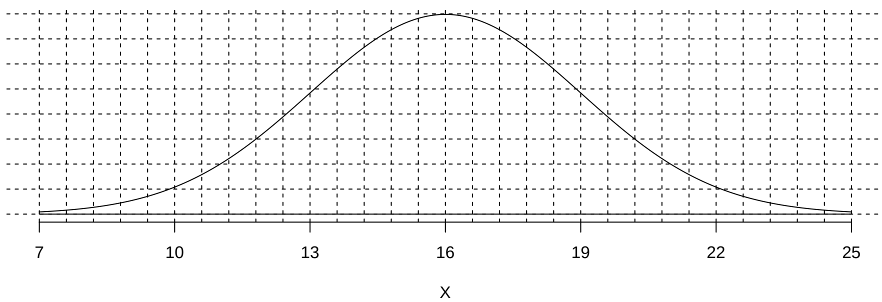
(b) Determine $P(Z > 51.8)$ by using the z-table.

11. **Problem**

Let X be a normal random variable with mean $\mu = 16$ and standard deviation $\sigma = 3$.

$$X \sim \mathcal{N}(16, 3)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



(a) Estimate $P(|X - \mu| > 4.8)$ by shading and counting.

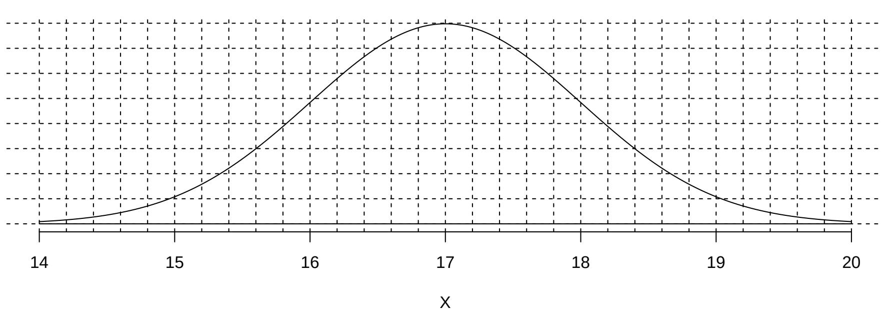
(b) Determine $P(|X - \mu| > 4.8)$ by using the z-table.

12. **Problem**

Let X be a normal random variable with mean $\mu = 17$ and standard deviation $\sigma = 1$.

$$X \sim \mathcal{N}(17, 1)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



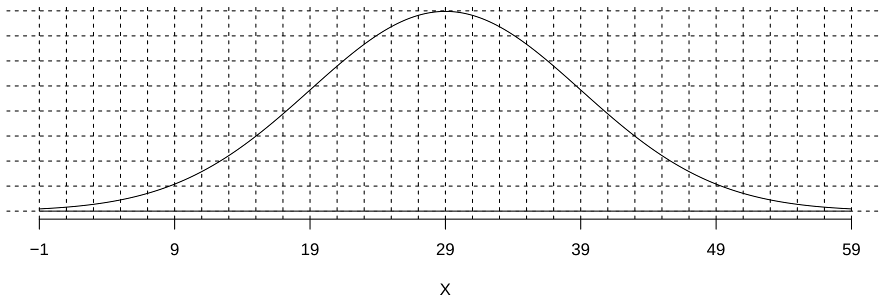
(a) Estimate x such that $P(X > x) = 0.12$ by shading and counting.

(b) Determine z such that $P(X > x) = 0.12$ by using the z-table.

13. **Problem**
Let X be a normal random variable with mean $\mu = 29$ and standard deviation $\sigma = 10$.

$$X \sim \mathcal{N}(29, 10)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



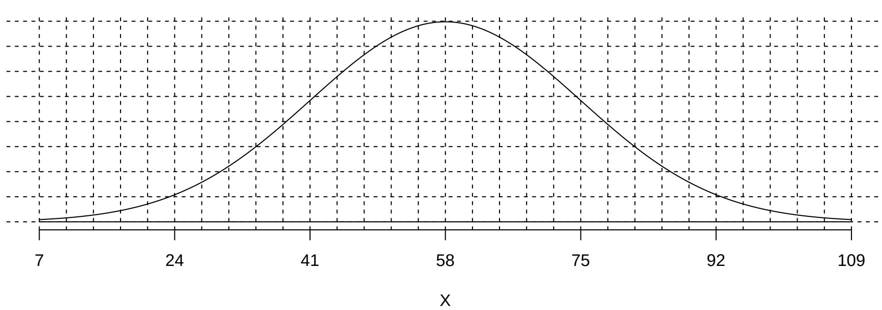
(a) Estimate $P(|X - \mu| < 12)$ by shading and counting.

(b) Determine $P(|X - \mu| < 12)$ by using the z-table.

14. **Problem**
Let X be a normal random variable with mean $\mu = 58$ and standard deviation $\sigma = 17$.

$$X \sim \mathcal{N}(58, 17)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



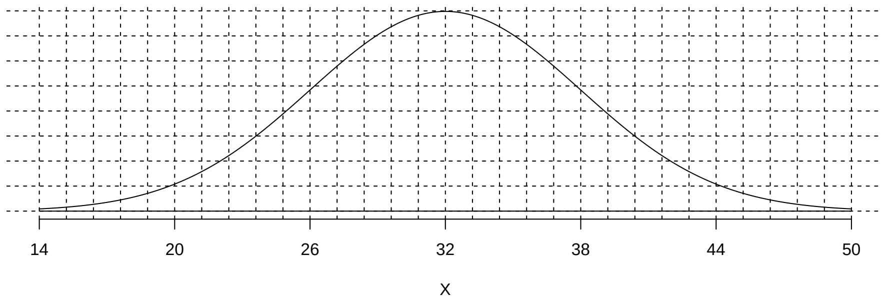
(a) Estimate $P(X < 51.2)$ by shading and counting.

(b) Determine $P(Z < 51.2)$ by using the z-table.

15. **Problem**
Let X be a normal random variable with mean $\mu = 32$ and standard deviation $\sigma = 6$.

$$X \sim \mathcal{N}(32, 6)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



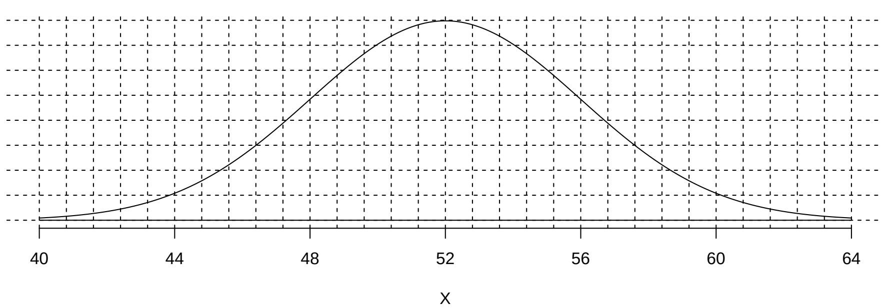
(a) Estimate a such that $P(|X - \mu| < a) = 0.16$ by shading and counting.

(b) Determine a such that $P(|X - \mu| < a) = 0.16$ by using the z-table.

16. **Problem**
Let X be a normal random variable with mean $\mu = 52$ and standard deviation $\sigma = 4$.

$$X \sim \mathcal{N}(52, 4)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



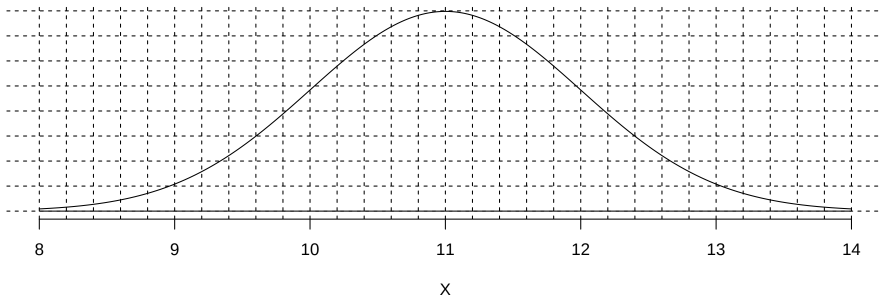
(a) Estimate a such that $P(|X - \mu| > a) = 0.55$ by shading and counting.

(b) Determine z such that $P(|X - \mu| > a) = 0.55$ by using the z-table.

17. **Problem**
Let X be a normal random variable with mean $\mu = 11$ and standard deviation $\sigma = 1$.

$$X \sim \mathcal{N}(11, 1)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



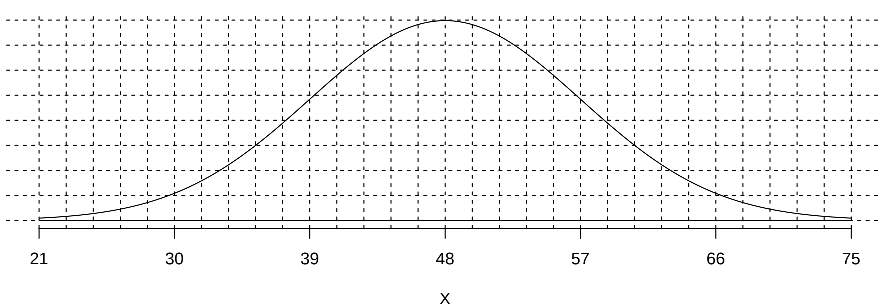
(a) Estimate $P(X > 11.2)$ by shading and counting.

(b) Determine $P(Z > 11.2)$ by using the z-table.

18. **Problem**
Let X be a normal random variable with mean $\mu = 48$ and standard deviation $\sigma = 9$.

$$X \sim \mathcal{N}(48, 9)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



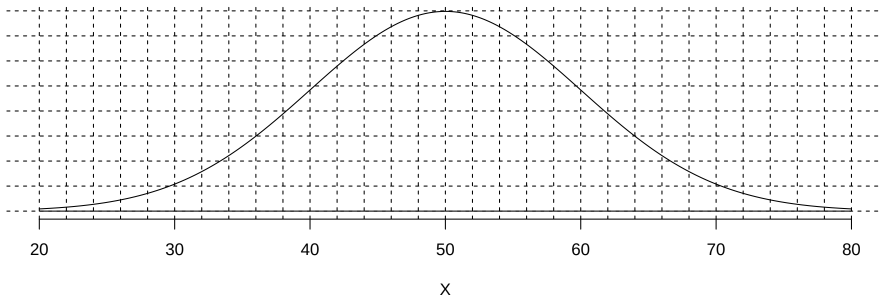
(a) Estimate $P(|X - \mu| > 16.2)$ by shading and counting.

(b) Determine $P(|X - \mu| > 16.2)$ by using the z-table.

19. **Problem**
Let X be a normal random variable with mean $\mu = 50$ and standard deviation $\sigma = 10$.

$$X \sim \mathcal{N}(50, 10)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



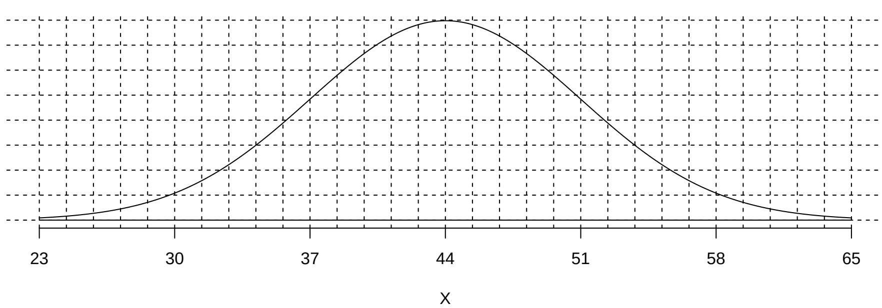
(a) Estimate x such that $P(X > x) = 0.73$ by shading and counting.

(b) Determine z such that $P(X > x) = 0.73$ by using the z-table.

20. **Problem**
Let X be a normal random variable with mean $\mu = 44$ and standard deviation $\sigma = 7$.

$$X \sim \mathcal{N}(44, 7)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



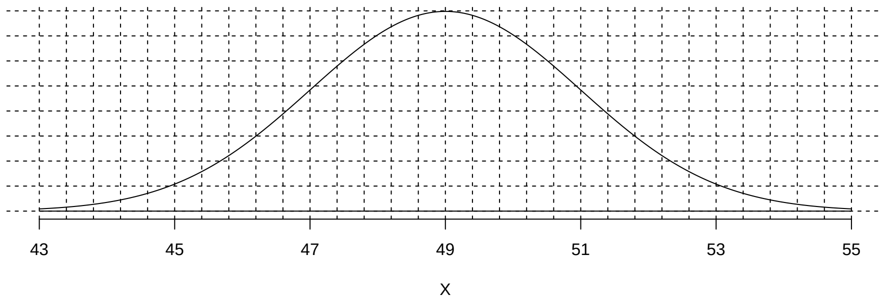
(a) Estimate x such that $P(X < x) = 0.66$ by shading and counting.

(b) Determine x such that $P(X < x) = 0.66$ by using the z-table.

21. **Problem**
Let X be a normal random variable with mean μ = 49 and standard deviation σ = 2.

$$X \sim \mathcal{N}(49, 2)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



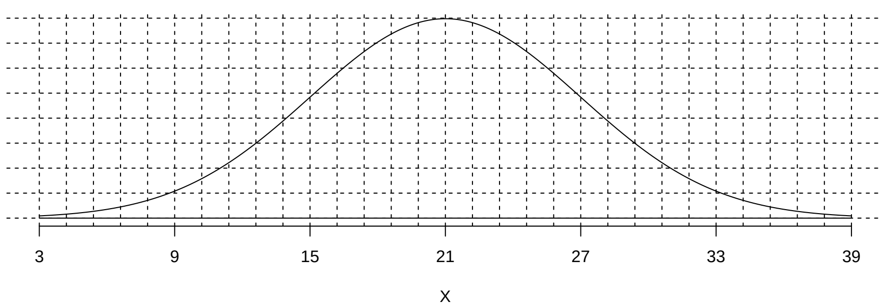
(a) Estimate a such that $P(|X - \mu| < a)$ = 0.31 by shading and counting.

(b) Determine a such that $P(|X - \mu| < a)$ = 0.31 by using the z-table.

22. **Problem**
Let X be a normal random variable with mean μ = 21 and standard deviation σ = 6.

$$X \sim \mathcal{N}(21, 6)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



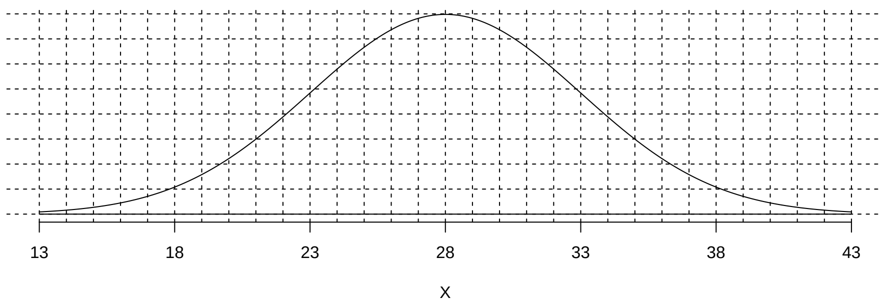
(a) Estimate $P(X < 27)$ by shading and counting.

(b) Determine $P(Z < 27)$ by using the z-table.

23. **Problem**
Let X be a normal random variable with mean $\mu = 28$ and standard deviation $\sigma = 5$.

$$X \sim \mathcal{N}(28, 5)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



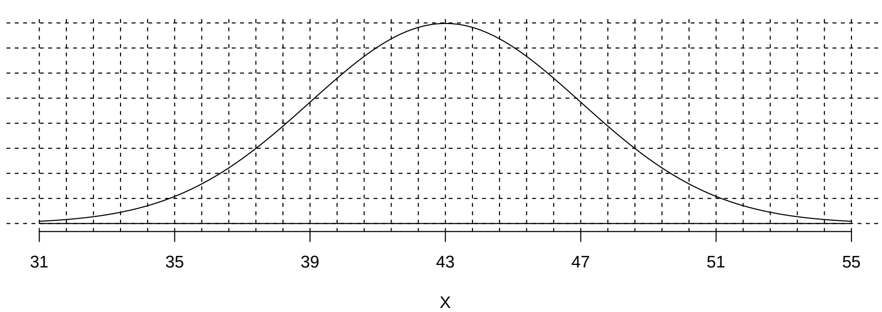
(a) Estimate $P(|X - \mu| < 7)$ by shading and counting.

(b) Determine $P(|X - \mu| < 7)$ by using the z-table.

24. **Problem**
Let X be a normal random variable with mean $\mu = 43$ and standard deviation $\sigma = 4$.

$$X \sim \mathcal{N}(43, 4)$$

The figure below shows the density of random variable X. Each grid square represents 1% of probability.



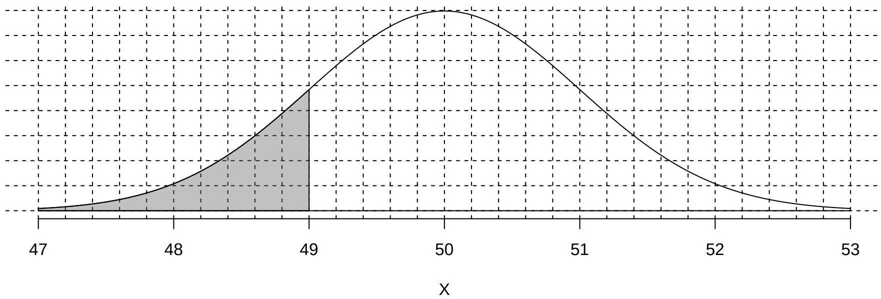
(a) Estimate a such that $P(|X - \mu| > a) = 0.42$ by shading and counting.

(b) Determine z such that $P(|X - \mu| > a) = 0.42$ by using the z-table.

1. (a) You will want a z-score.

$$z = \frac{x - \mu}{\sigma} = -1$$

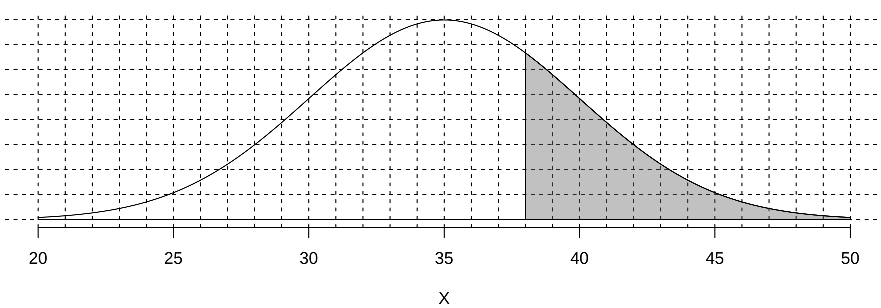
(b) The shaded region is shown below.



You should count about 16 shaded squares, giving a probability of about 0.16.

(c) The probability is 0.1587.

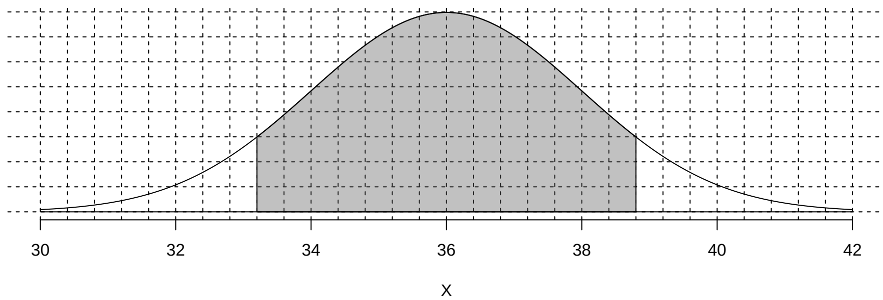
2. (a) The shaded region is shown below.



You should count about 27 shaded squares, giving a probability of about 0.27.

(b) The probability is 0.2743.

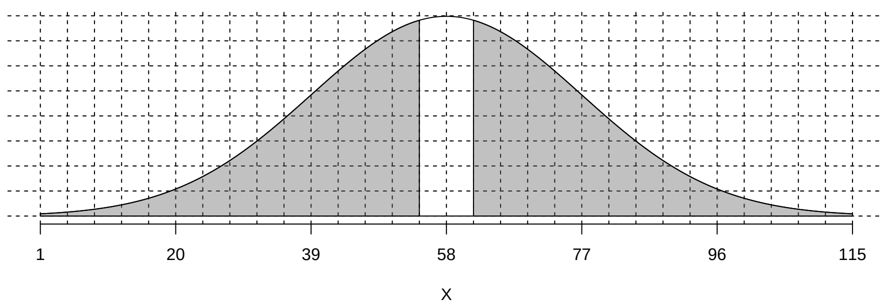
3. (a) The shaded region is shown below.



You should count about 84 shaded squares, giving a probability of about 0.84.

(b) The probability is 0.8385.

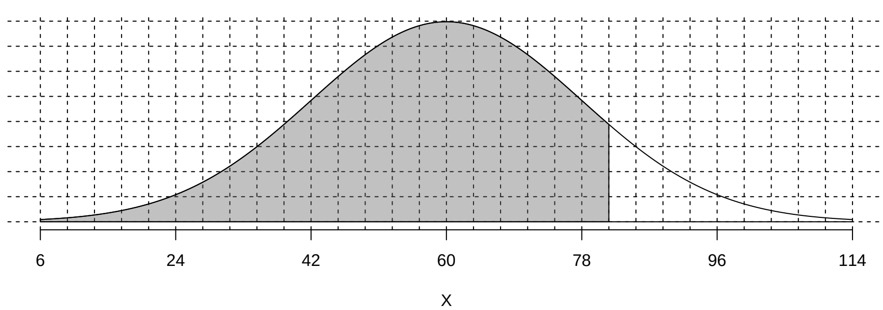
4. (a) The shaded regions are shown below.



You should count about 84 shaded squares, giving a probability of about 0.84.

(b) The probability is 0.8415.

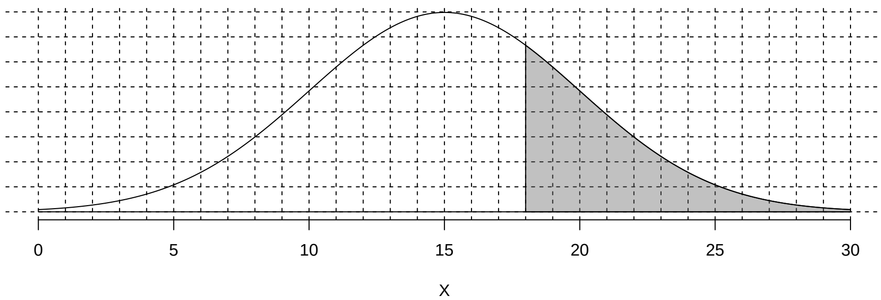
5. (a) The shaded region is shown below.



When you have shaded 88 squares, starting on the left, you should end around $x = 81.6$.

(b) $x \approx 81.06$

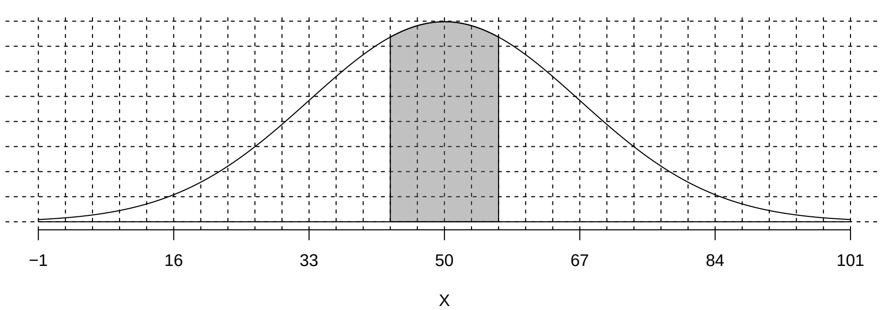
6. (a) The shaded region is shown below.



When you have shaded 27 squares, starting on the right, you should end around $x = 18$.

(b) $x = 11.95$

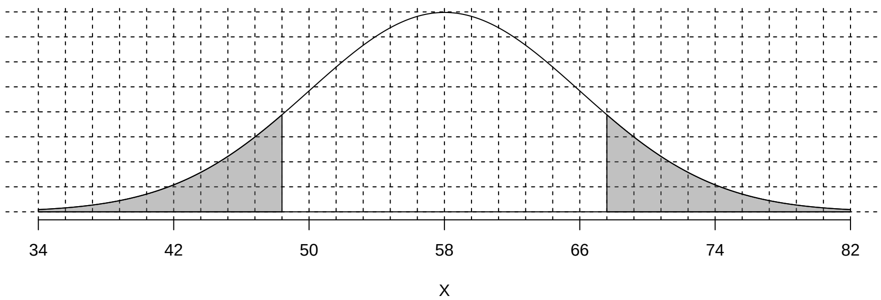
7. (a) The shaded region is shown below.



When you have shaded 31 squares, starting in the middle, you should end near $x = 56.8$, giving $a = 6.8$.

(b) $a = 6.8$

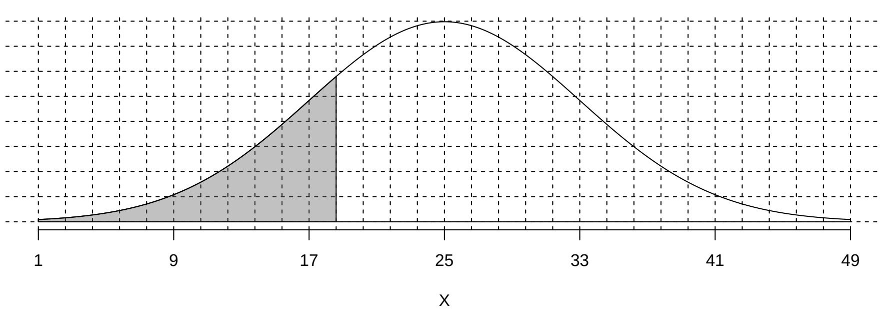
8. (a) The shaded regions are shown below.



When you have shaded 23 squares, starting at both tails, you should end near x = 67.6. Really, you want to shade 11.5 squares starting from the left and also 11.5 squares starting from the right. This gives $a = \boxed{9.6}$.

(b) $a = \boxed{9.6}$

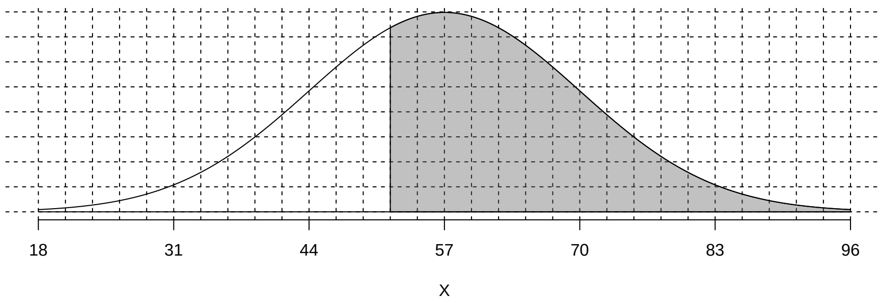
9. (a) The shaded region is shown below.



When you have shaded 21 squares, starting on the left, you should end around $x = 18.6$.

(b) $x \approx 18.52$

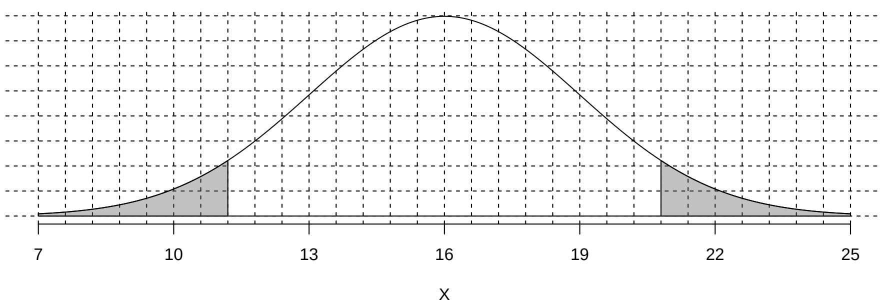
10. (a) The shaded region is shown below.



You should count about 66 shaded squares, giving a probability of about 0.66.

(b) The probability is 0.6554.

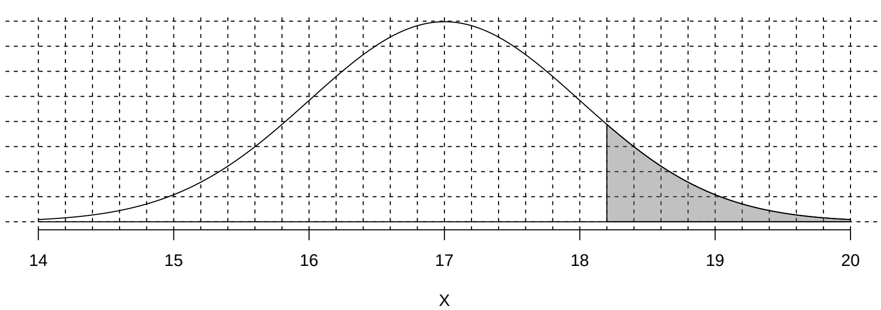
11. (a) The shaded regions are shown below.



You should count about 11 shaded squares, giving a probability of about 0.11.

(b) The probability is 0.1096.

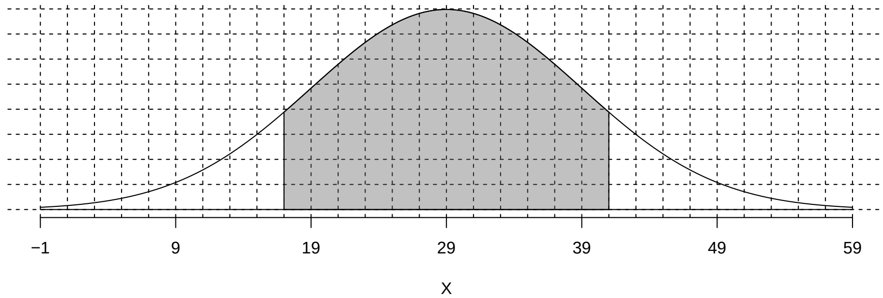
12. (a) The shaded region is shown below.



When you have shaded 12 squares, starting on the right, you should end around $x = 18.2$.

(b) $x = 15.83$

13. (a) The shaded region is shown below.



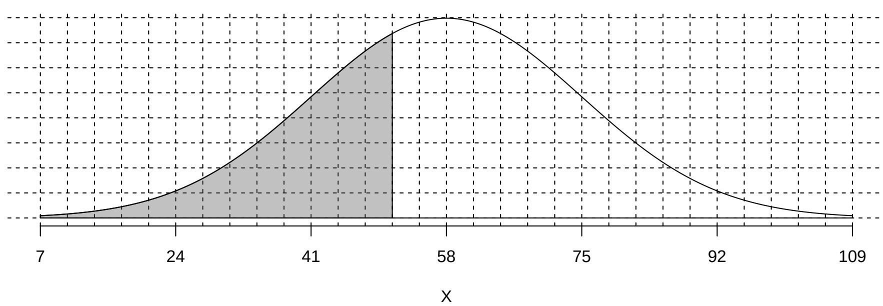
You should count about 77 shaded squares, giving a probability of about 0.77.

(b) The probability is 0.7699.

14. (a) You will want a z-score.

$$z = \frac{x - \mu}{\sigma} = -0.4$$

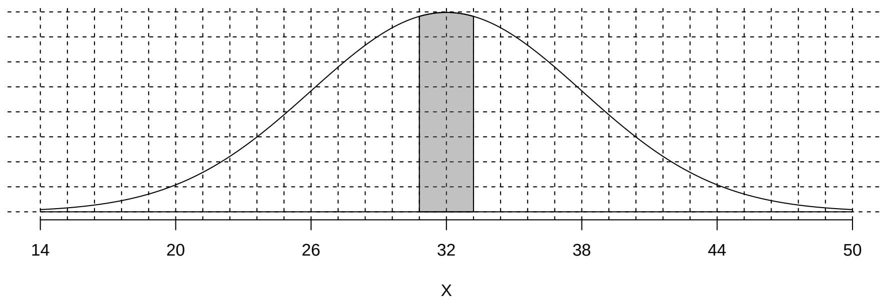
(b) The shaded region is shown below.



You should count about 34 shaded squares, giving a probability of about 0.34.

(c) The probability is 0.3446.

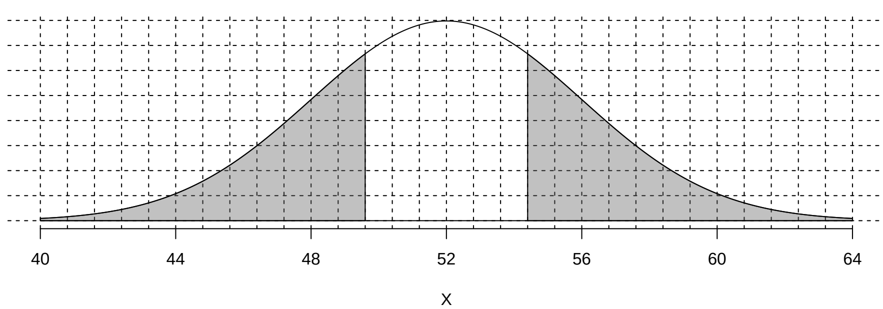
15. (a) The shaded region is shown below.



When you have shaded 16 squares, starting in the middle, you should end near $x = 33.2$, giving $a = 1.2$.

(b) $a = 1.2$

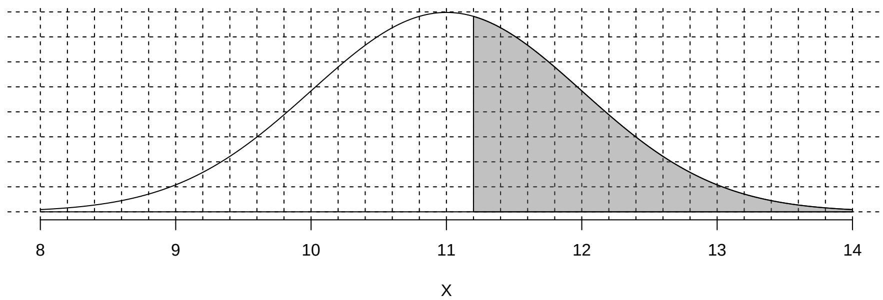
16. (a) The shaded regions are shown below.



When you have shaded 55 squares, starting at both tails, you should end near $x = 54.4$. Really, you want to shade 27.5 squares starting from the left and also 27.5 squares starting from the right. This gives $a = \boxed{2.4}$.

(b) $a = \boxed{2.4}$

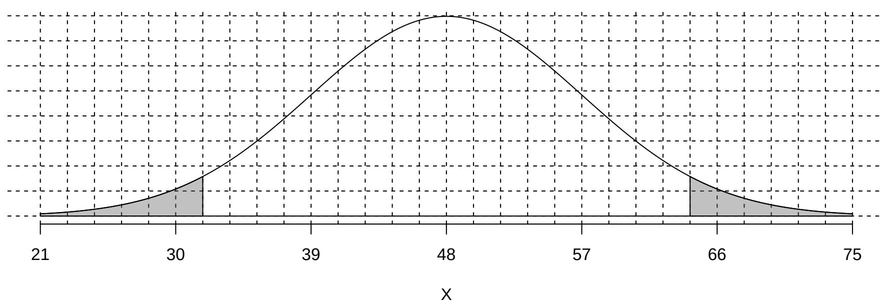
17. (a) The shaded region is shown below.



You should count about 42 shaded squares, giving a probability of about 0.42.

(b) The probability is 0.4207.

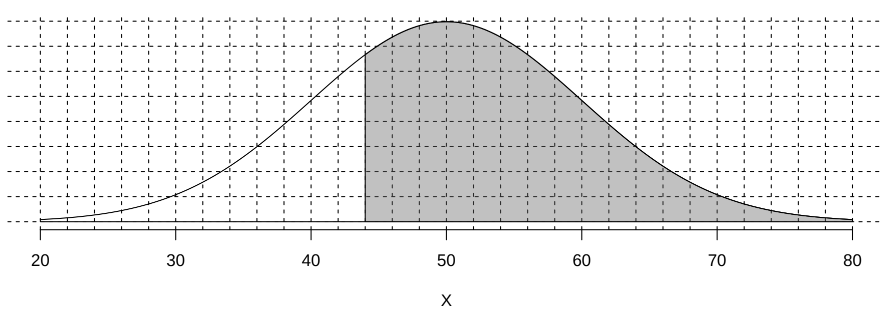
18. (a) The shaded regions are shown below.



You should count about 7 shaded squares, giving a probability of about 0.07.

(b) The probability is 0.0719.

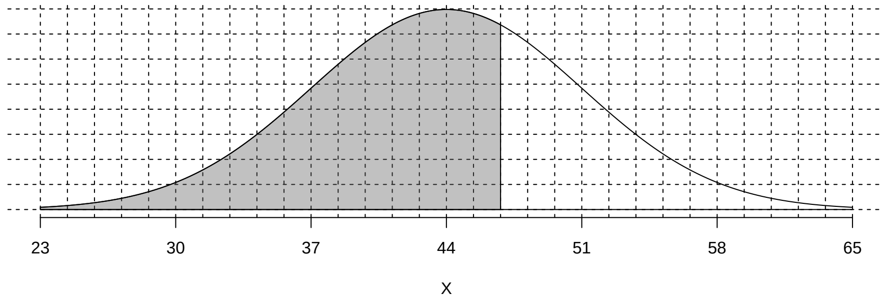
19. (a) The shaded region is shown below.



When you have shaded 73 squares, starting on the right, you should end around $x = 44$.

(b) $x = 56.1$

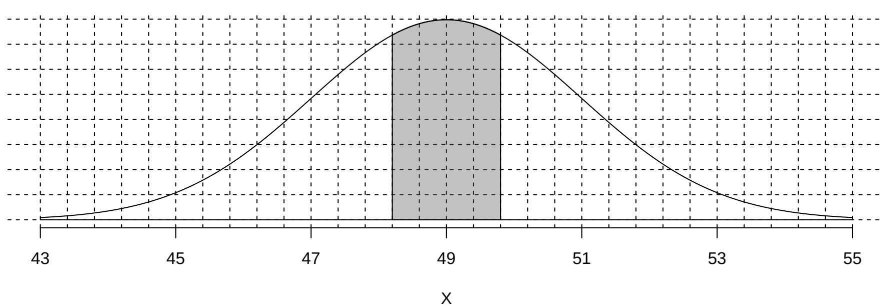
20. (a) The shaded region is shown below.



When you have shaded 66 squares, starting on the left, you should end around $x = 46.8$.

(b) $x \approx 46.87$

21. (a) The shaded region is shown below.



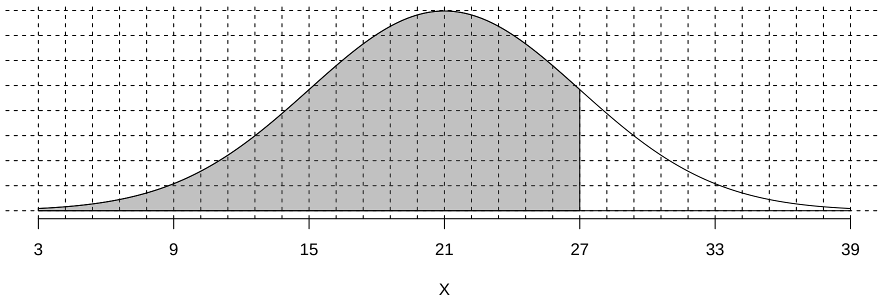
When you have shaded 31 squares, starting in the middle, you should end near $x = 49.8$, giving $a = 0.8$.

(b) $a = 0.8$

22. (a) You will want a z-score.

$$z = \frac{x - \mu}{\sigma} = 1$$

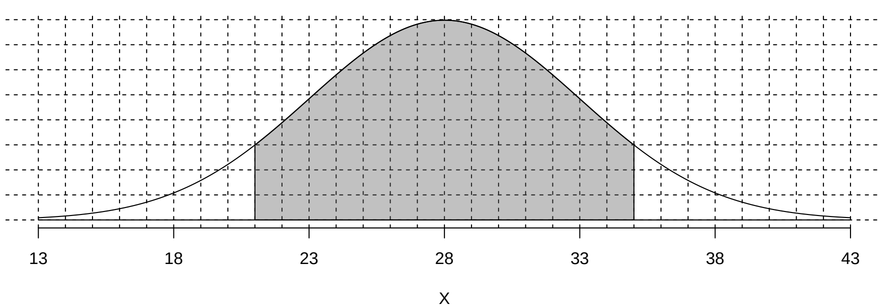
(b) The shaded region is shown below.



You should count about 84 shaded squares, giving a probability of about 0.84.

(c) The probability is 0.8413.

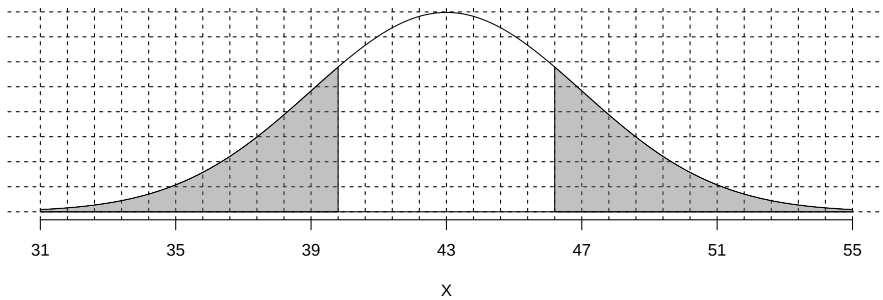
23. (a) The shaded region is shown below.



You should count about 84 shaded squares, giving a probability of about 0.84.

(b) The probability is 0.8385.

24. (a) The shaded regions are shown below.



When you have shaded 42 squares, starting at both tails, you should end near x = 46.2. Really, you want to shade 21 squares starting from the left and also 21 squares starting from the right. This gives $a = \boxed{3.2}$.

(b) $a = \boxed{3.24}$