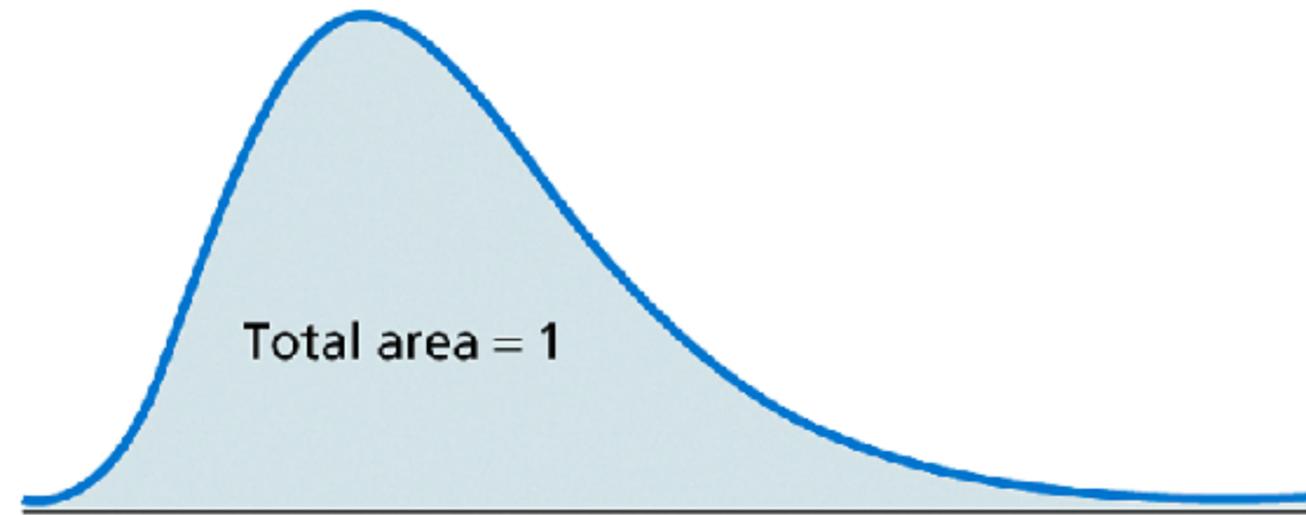


Figure 6.1



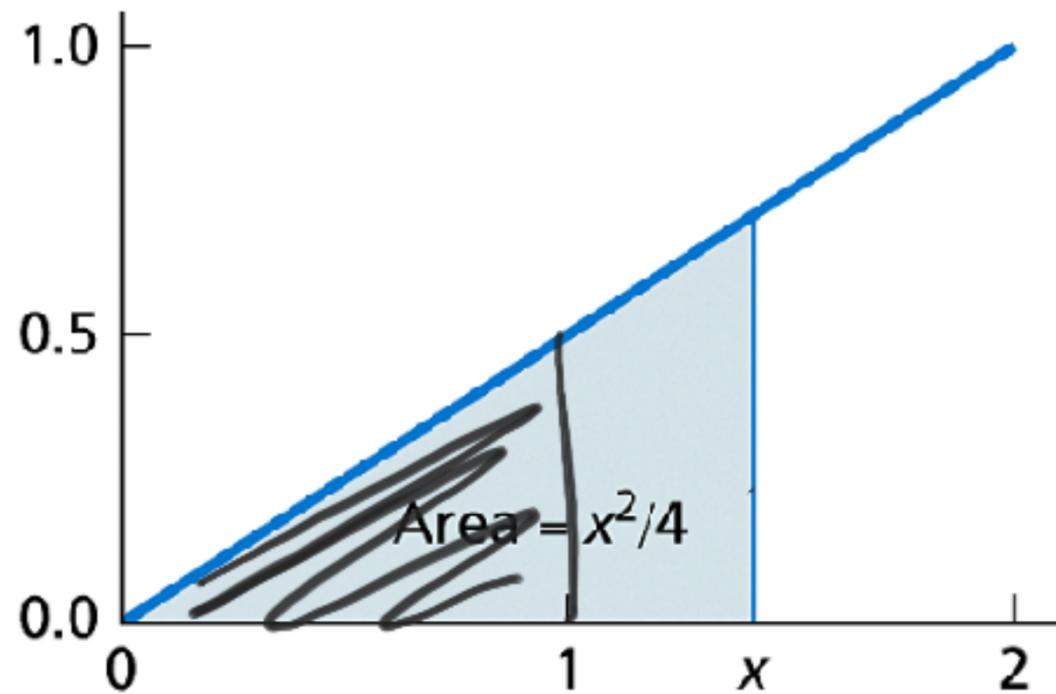
Properties 1 and 2 of [Key Fact 6.1](#) □

Key Fact 6.1: Basic Properties of Density Curves

Property 1: A density curve is always on or above the horizontal axis.

Property 2: The total area under a density curve (and above the horizontal axis) equals 1.

Crystal size The crystals of a certain mineral are cubes. The length of the sides is a variable that has the density curve shown in Fig. 6.3(a) \square , where length is measured in millimeters (mm). Using the facts that the equation of this density curve is $y = x/2$ for $0 < x < 2$ and that the area of a triangle equals one-half its base times its height, we see that the area under this density curve to the left of any number x between 0 and 2 equals $x^2/4$, as shown in Fig. 6.3(b) \square .



(b)

$$y = \frac{1}{2}x$$
$$y = \frac{1}{4}x^2$$

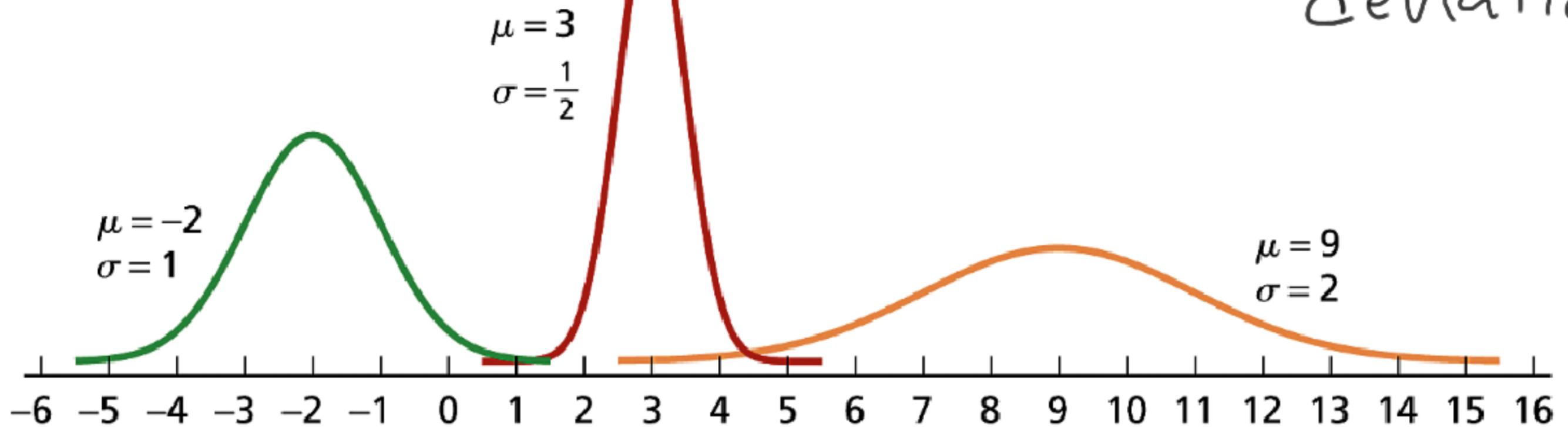
$$x = 1$$
$$\text{Area} = \frac{1}{4}$$
$$= 0.25$$
$$25\%$$

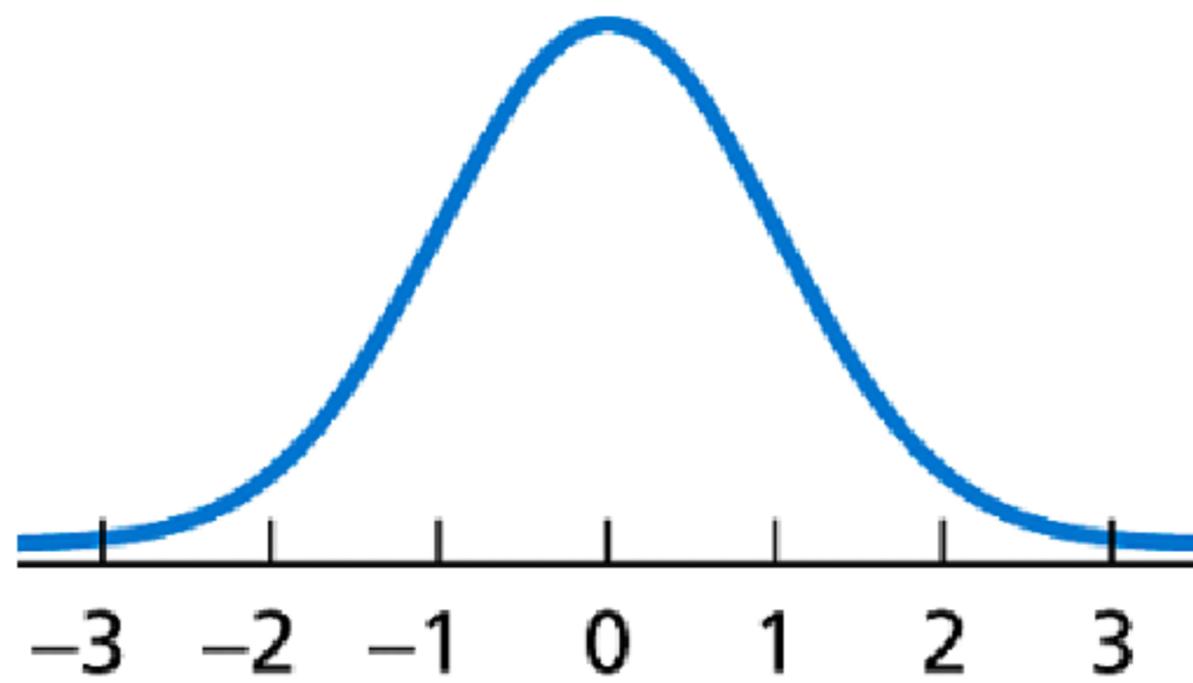
Definition 6.1: Normally Distributed Variable

A variable is said to be a **normally distributed variable** or to have a **normal distribution** if its distribution has the shape of a normal curve.

$\mu = \text{mean}$

$\sigma = \text{standard deviation}$





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

Definition 6.2: Standard Normal Distribution; Standard Normal Curve

A normally distributed variable having mean 0 and standard deviation 1 is said to have the **standard normal distribution**. Its associated normal curve is called the **standard normal curve**, which is shown in [Fig. 6.11](#) \square .

Key Fact 6.5: Basic Properties of the Standard Normal Curve

Property 1: The total area under the standard normal curve is 1.

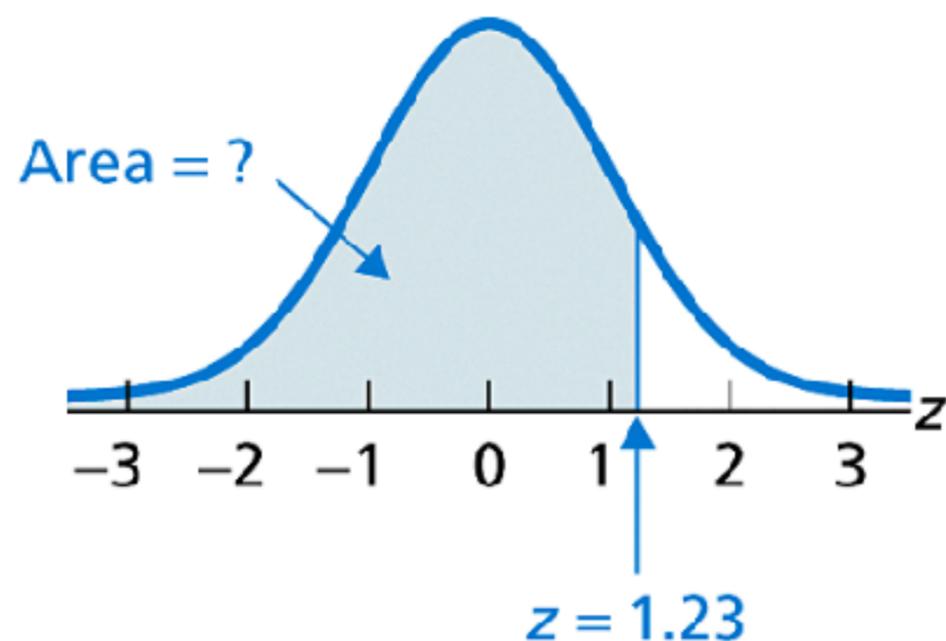
Property 2: The standard normal curve extends indefinitely in both directions, approaching, but never touching, the horizontal axis as it does so.

Property 3: The standard normal curve is symmetric about 0; that is, the part of the curve to the left of the dashed line in Fig. 6.14  is the mirror image of the part of the curve to the right of it.

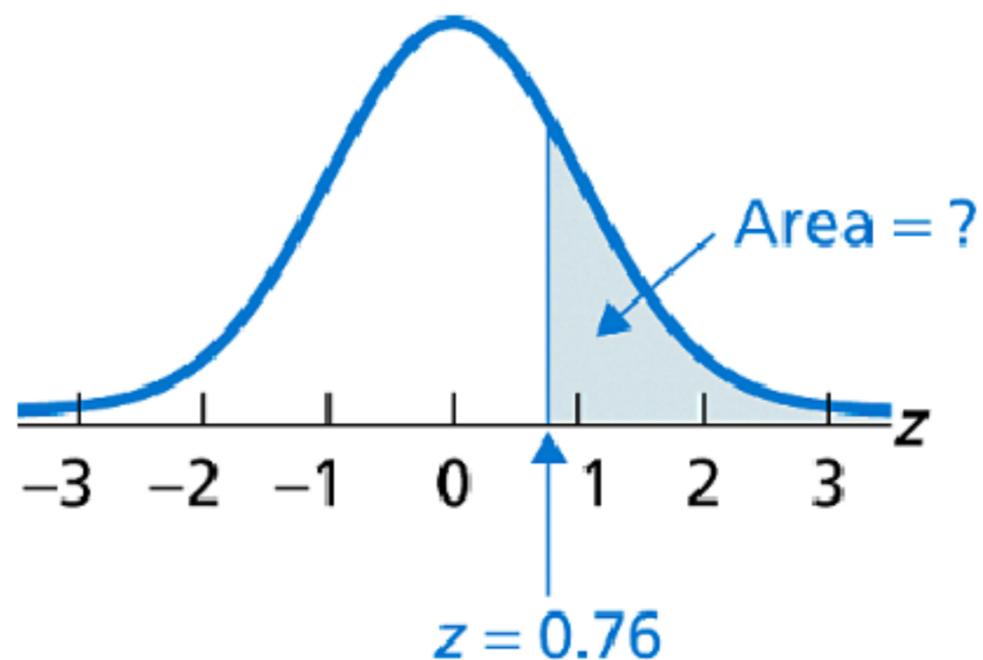
Property 4: Almost all the area under the standard normal curve lies between -3 and 3 .

Determine the area under the standard normal curve that lies to the left of 1.23,

0.8907



Determine the area under the standard normal curve that lies to the right of 0.76,



0.7764

$1 - 0.7764$
 0.2236

	Second decimal place in z									
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177

$z = 1.23 \Rightarrow 0.8907$

z	Second decimal place in z									
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133

$$z = 0.76 \Rightarrow 0.7764$$

Determine the area under the standard normal curve that lies between -0.68 and 1.82

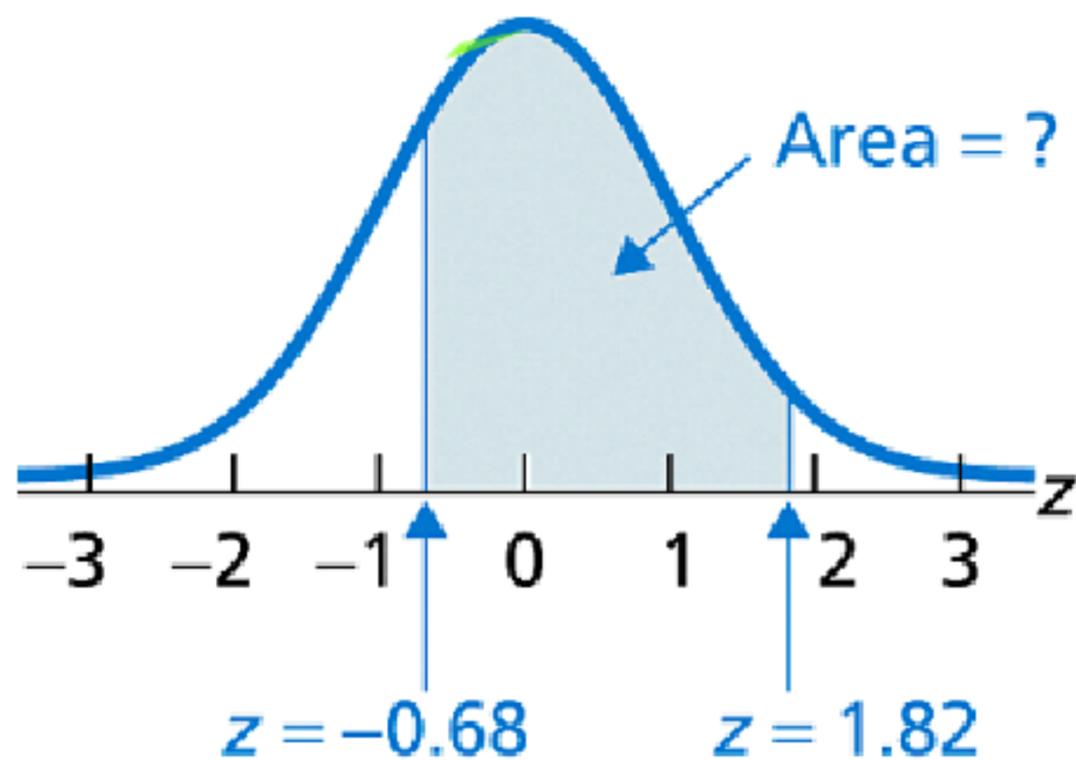
$$z = -0.68 \rightarrow .2483$$

$$z = 1.82 \rightarrow .9656$$

$$.9656 - .2483 =$$

$$\boxed{.7173}$$

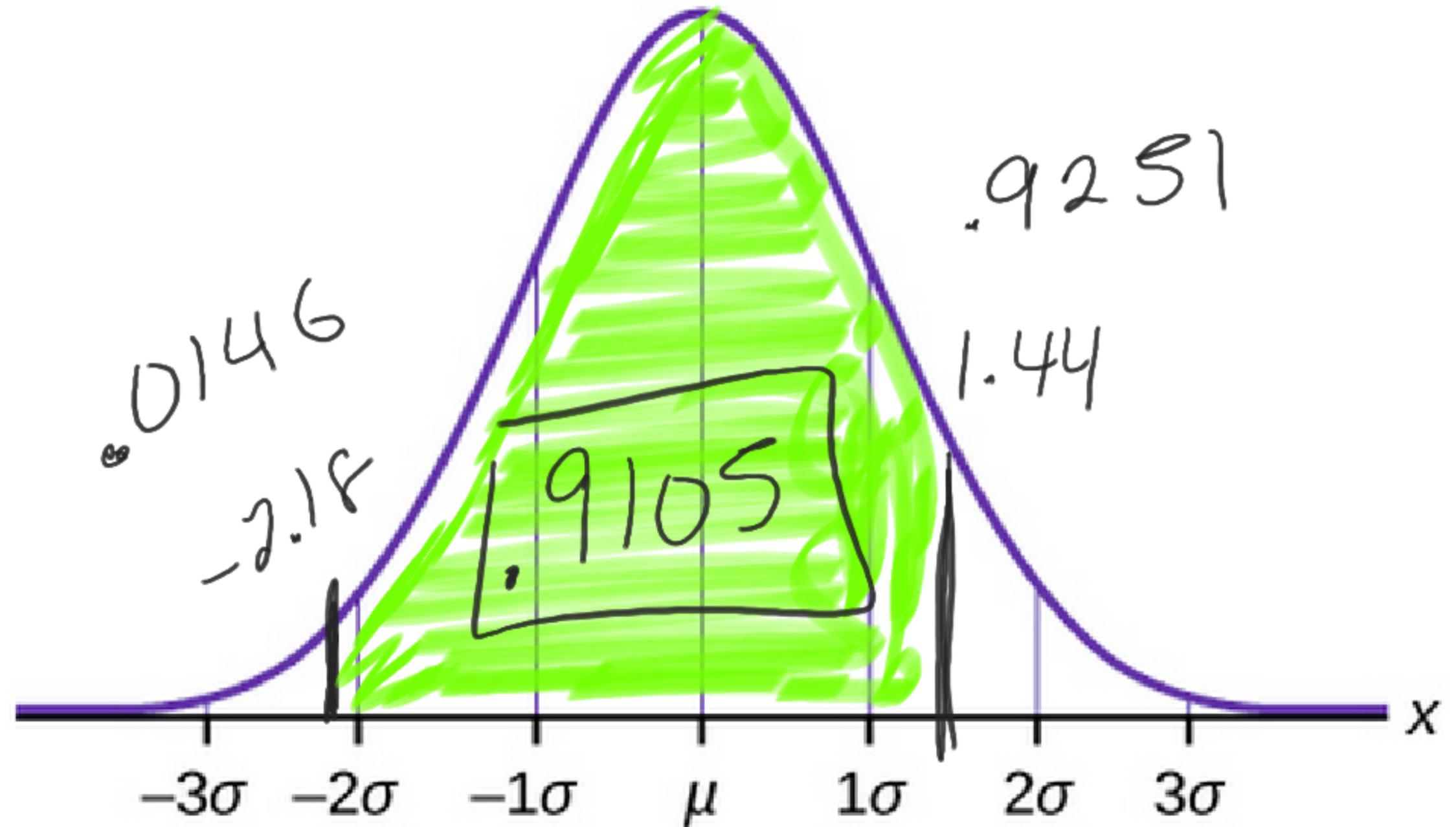
Between
 $-0.68 \leftrightarrow 1.82$



6.63 Determine the area under the standard normal curve that lies between

a. -2.18 and 1.44 .

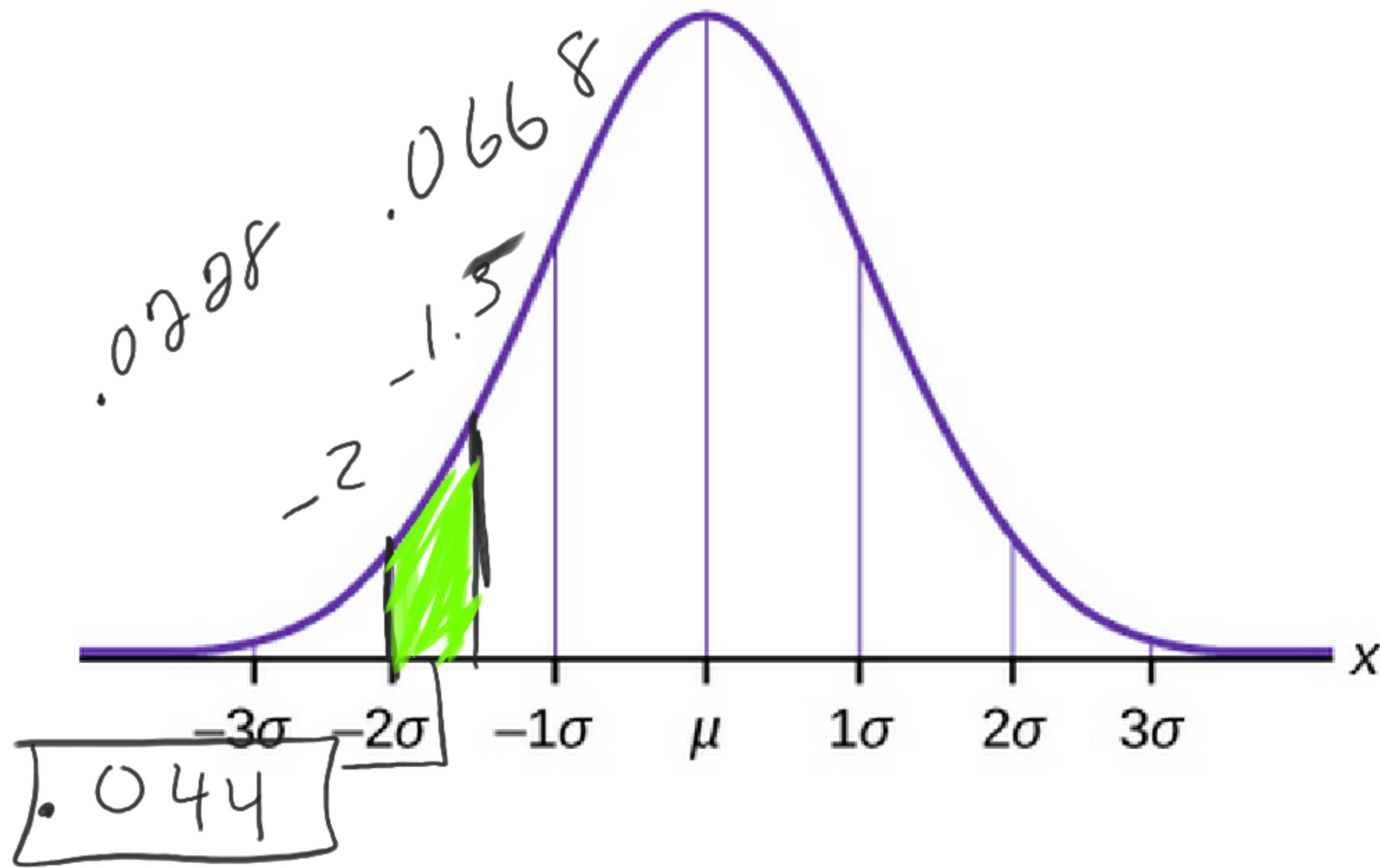
b. -2 and -1.5 .



6.63 Determine the area under the standard normal curve that lies between

a. -2.18 and 1.44 .

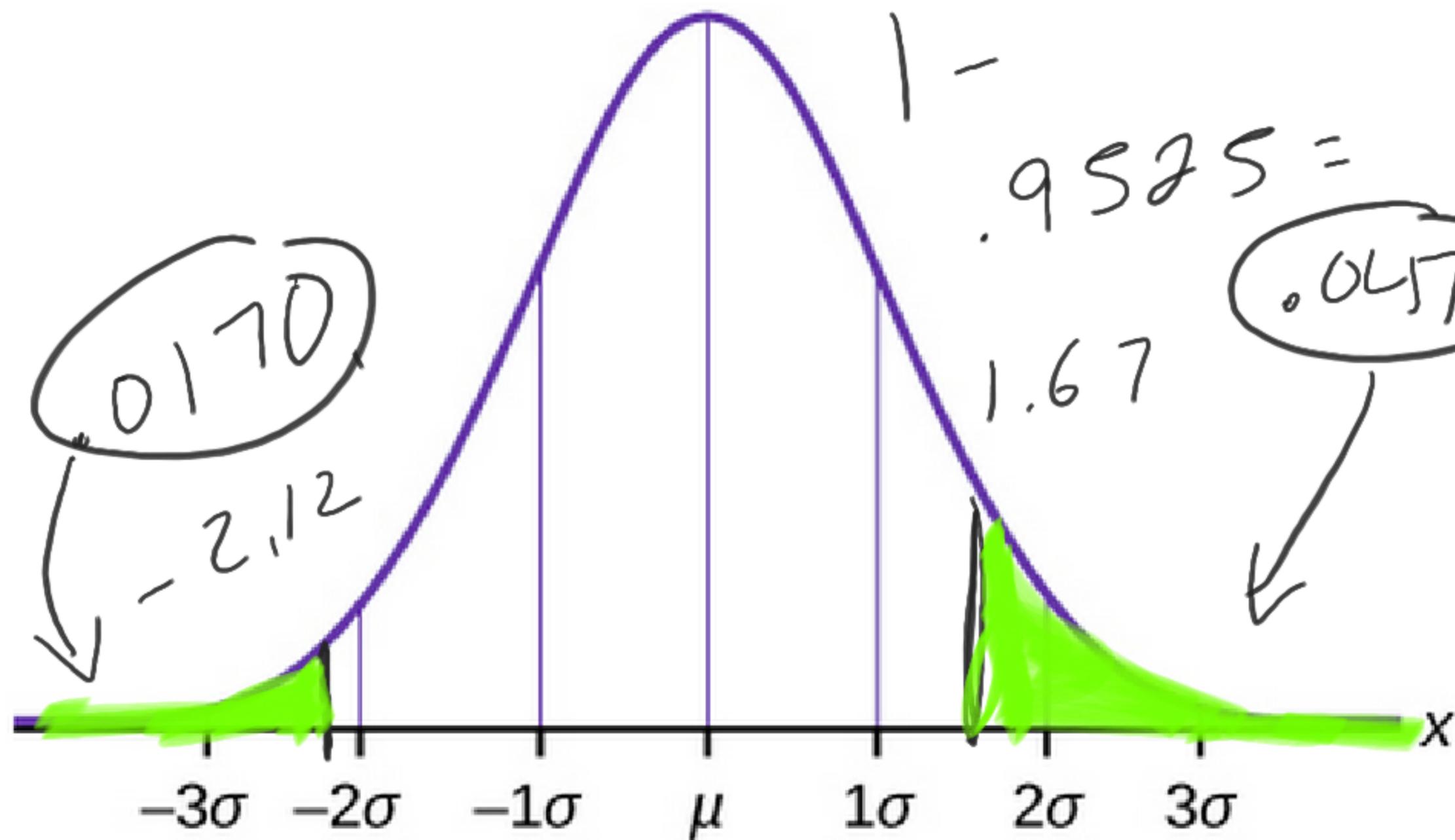
b. -2 and -1.5 .



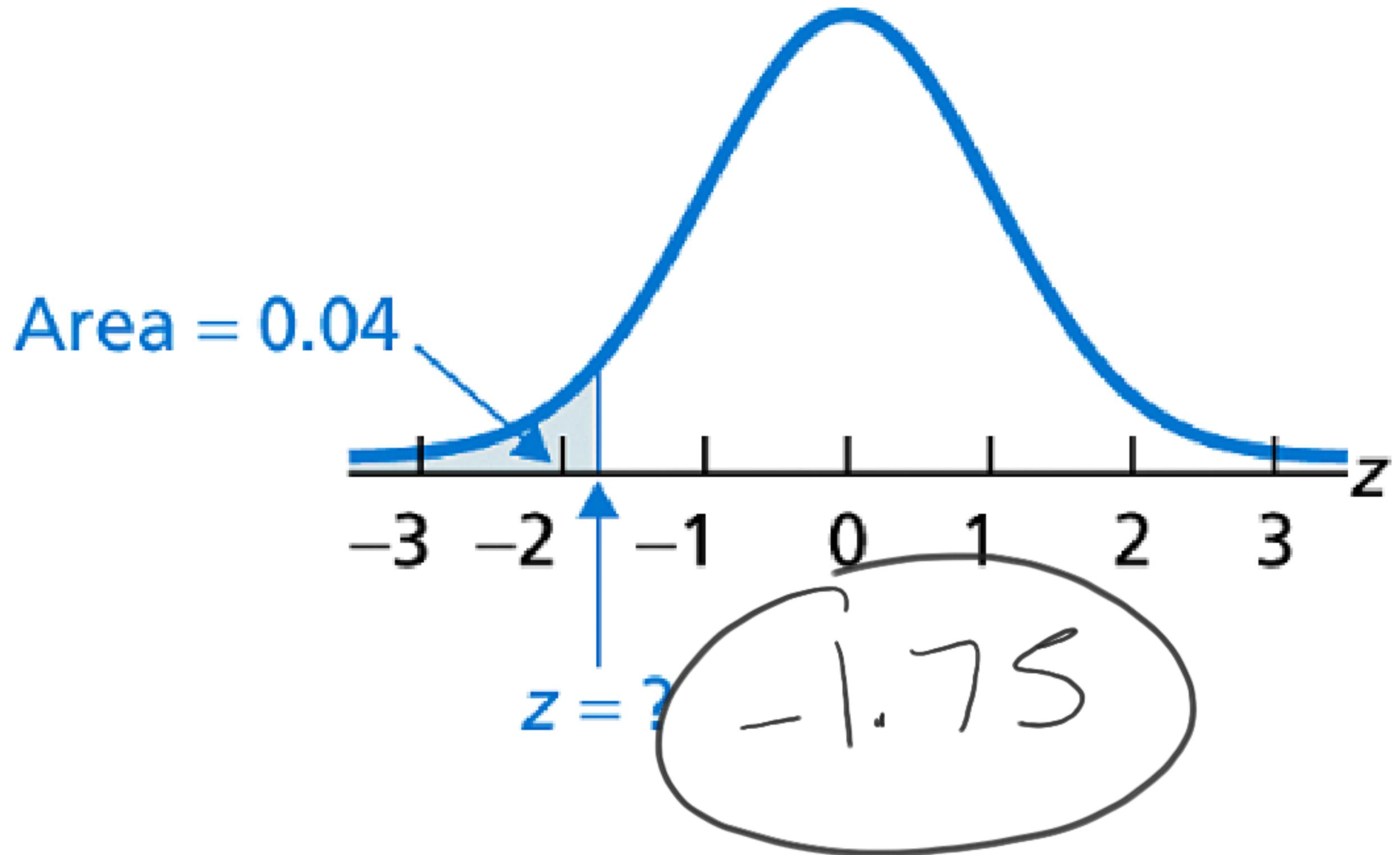
6.65 Find the area under the standard normal curve that lies

a. either to the left of -2.12 or to the right of 1.67 .

0.0645



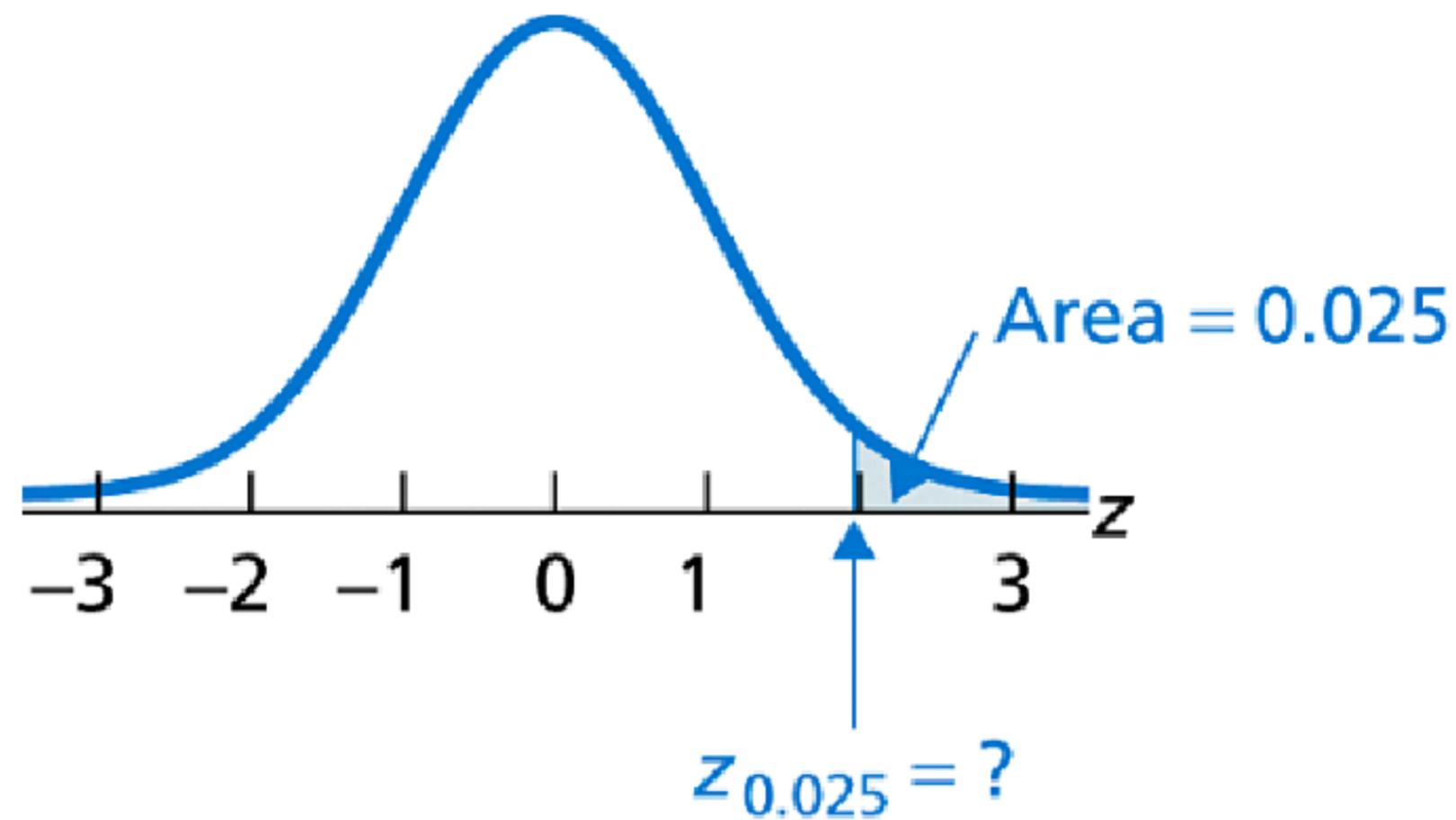
Determine the z-score having an area of 0.04 to its left under the standard normal curve,



Use Table II to find

a. $z_{0.025} = 1.96$

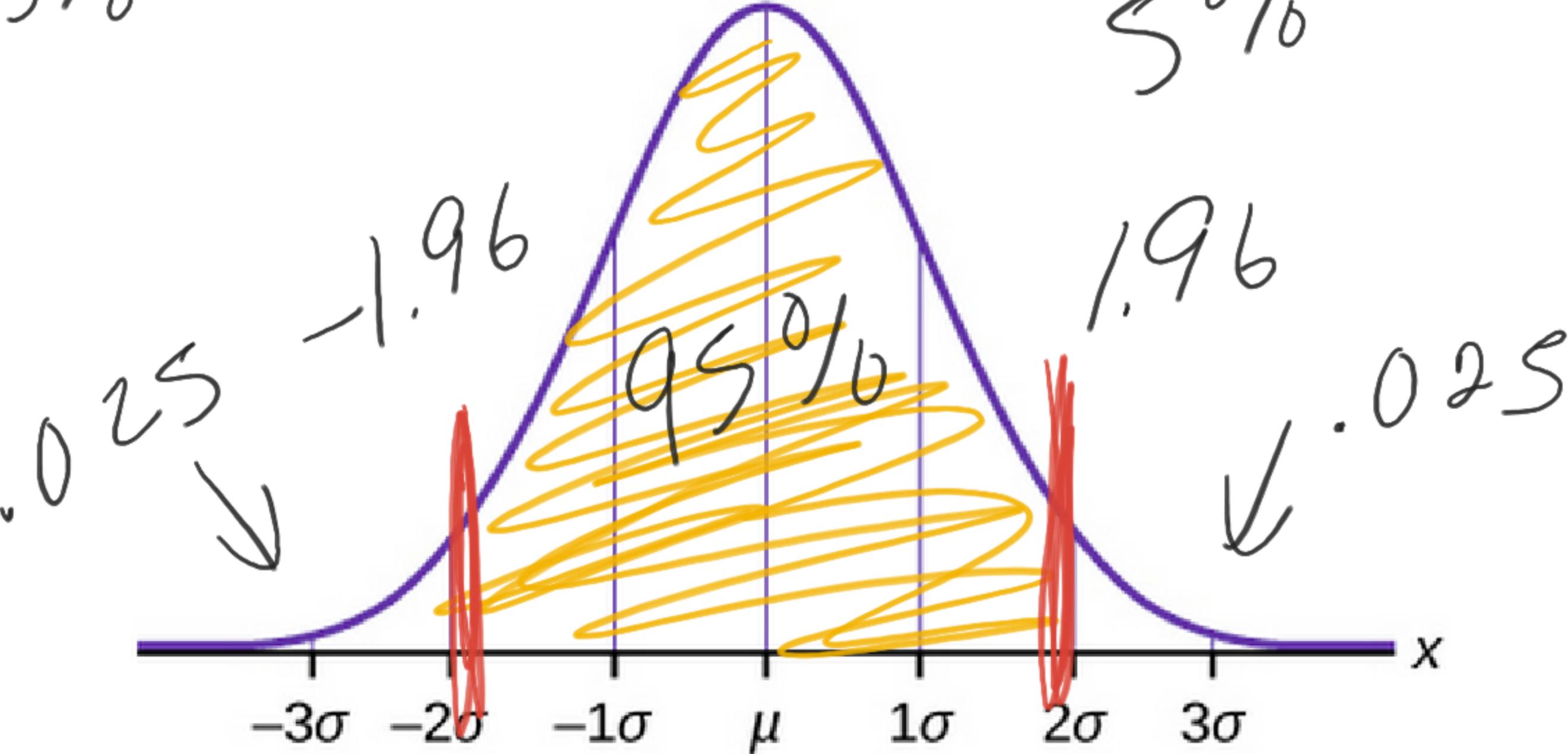
b. $z_{0.05} = 1.645$



0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446	-1.7
0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548	-1.6
0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668	-1.5

Find the two z-scores that divide the area under the standard normal curve into a middle 0.95 area and two outside 0.025 areas, as shown in Fig. 6.23(a) \square .

95% $-1.96 \Leftrightarrow 1.96$ 5% left \rightarrow



$$90\% \rightarrow 1.645$$

$$95\% \rightarrow 1.96$$

$$99\% \rightarrow 2.576$$