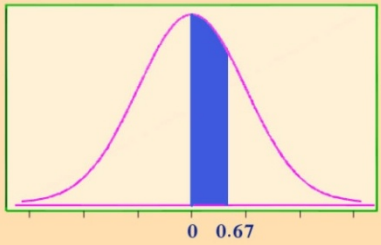
Chapter 6, Ex. 6-1

In Exercises 27, 29, 31, 33 and 39, find the probabilities for each, using the standard normal distribution.

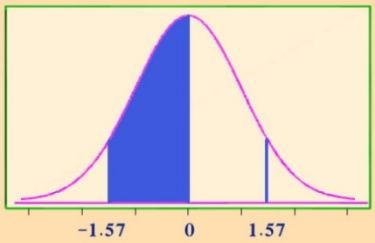
(27)

P (0 < Z < 0.67)
= 0.2486



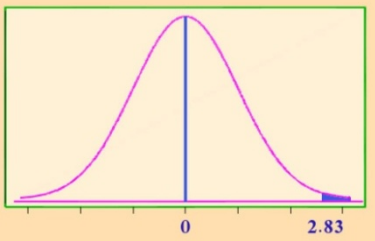
(29)

P (-1.57 < Z < 0)
= 0.4418



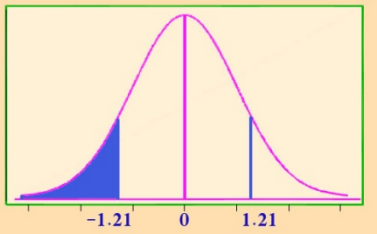
(31)

P (Z > 2.83)
0.5 - 0.4977 = 0.0023



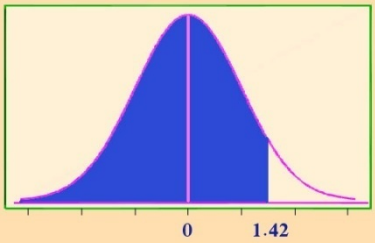
(33)

P (Z < -1.21)
0.5 - 0.3869 = 0.1131



(39)

P (Z < 1.42)
0.5 + 0.4222 = 0.9222



49. Find two z values, one positive and one negative that are equidistant from the mean so that the areas in the two tails total the following values.
a. 5%
c. 1%

(49.a)

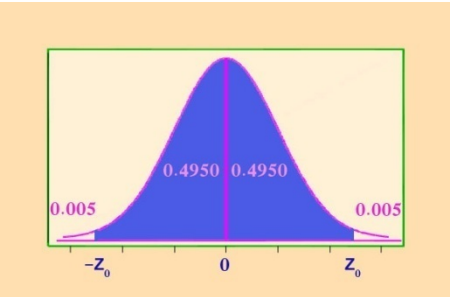
α/2 = 0.01/2 = 0.005

P (0 < Z < Z_0)

P (0 < Z < Z_0) = 0.5 - 0.005

P (0 < Z < Z_0) = 0.4950

Z_0 = 2.58



(49.b)

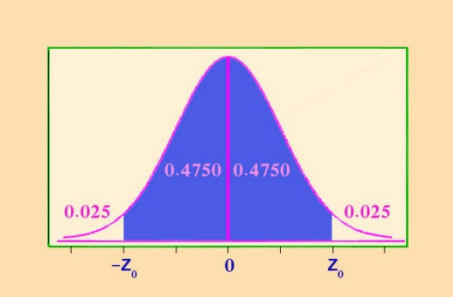
α/2 = 0.05/2 = 0.025

P (0 < Z < Z_0)

P (0 < Z < Z_0) = 0.5 - 0.025

P (0 < Z < Z_0) = 0.4750

Z_0 = 1.96



Chapter 6, Ex. 6-2

11. Credit Card Debt The average credit card debt for college seniors is $3262. If the debt is normally distributed with a standard deviation of $1100, find these probabilities.

a. That the senior owes at least $1000

b. That the senior owes more than $4000

c. That the senior owes between $3000 and $4000

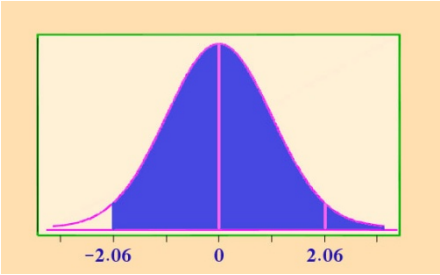
(11.a)

P (X ≥ 1000)

$$P\left(\frac{X-\mu}{\sigma} \geq \frac{1000-3262}{1100}\right)$$

P (Z ≥ -2.06)

0.5 + 0.4803 = 0.9803



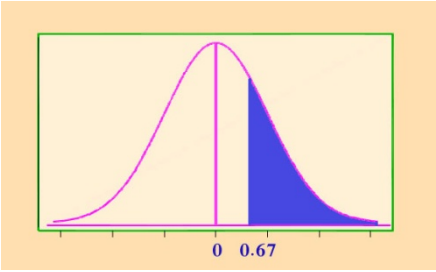
(11.b)

P (X > 4000)

$$P\left(\frac{X-\mu}{\sigma} > \frac{4000-3262}{1100}\right)$$

P (Z > 0.67)

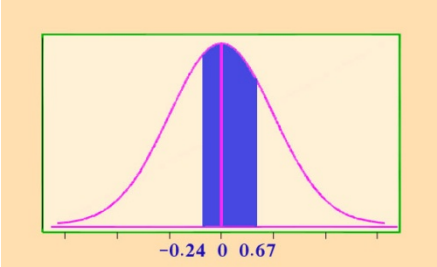
0.5 - 0.2486 = 0.2514



(11.c)

P (3000 < X < 4000)

$$P(\frac{3000-3262}{1100} < \frac{X-\mu}{\sigma} < \frac{4000-3262}{1100})$$



P (-0.24 < Z < 0.67)

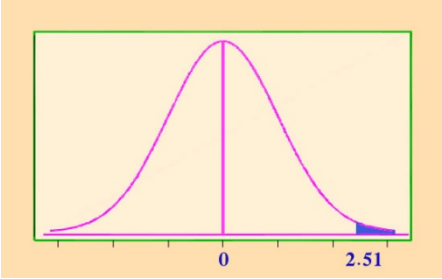
0.0948 + 0.2486 = 0.3434

21. Cost of Personal Computers. The average price of a personal computer (PC) is $949. If the computer prices are approximately normally distributed and σ = $100, what is the probability that a randomly selected PC costs more than $1200? The least expensive 10% of personal computers cost less than what amount?

(21.a)

P (X > 1200)

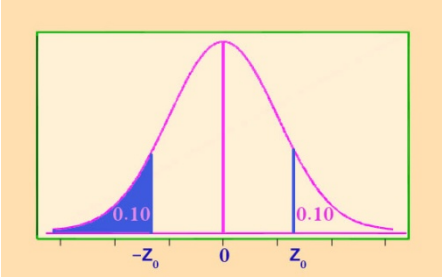
$$P(\frac{X-\mu}{\sigma} \geq \frac{1200-949}{100})$$



P (Z > 2.51)

0.5 - 0.4940 = 0.006

(21.b)



P (Z < - Z_0) = 0.1

0.5 - P (0 < Z < Z_0) = 0.1

P (0 < Z < Z_0) = 0.5 - 0.1 = 0.40

Z_0 = 1.28

$\frac{X-\mu}{\sigma}$ = -1.28

$\frac{X-949}{100}$ = -1.28

X - 949 = -128

X = 821

Chapter 6, Ex. 6-3

9. College Costs. The mean undergraduate cost for tuition, fees, room, and board for four-year institutions was $26,489 for a recent academic year. Suppose that σ = $3204 and 36 four-year institutions are randomly selected. Find the probability that the sample mean cost for these 36 schools is

a. Less than $25,000

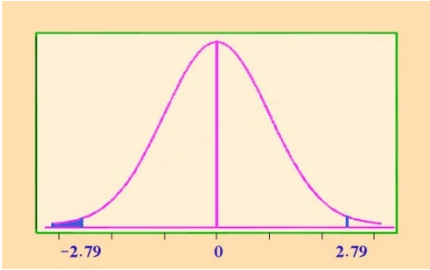
b. Greater than $26,000

c. Between $24,000 and $26,000

(9.a)

$P(\overline{X} < 25000)$

$$P\left(\frac{\overline{X}-\mu}{\frac{\sigma}{\sqrt{n}}} < \frac{25000-26489}{\frac{3204}{\sqrt{36}}}\right)$$



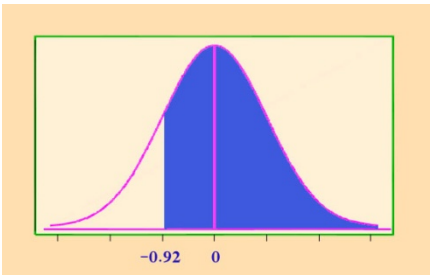
$P(Z < -2.79)$

$0.5 - 0.4974 = 0.0026$

(9.b)

$P(\overline{X} > 26000)$

$$P\left(\frac{\overline{X}-\mu}{\frac{\sigma}{\sqrt{n}}} > \frac{26000-26489}{\frac{3204}{\sqrt{36}}}\right)$$



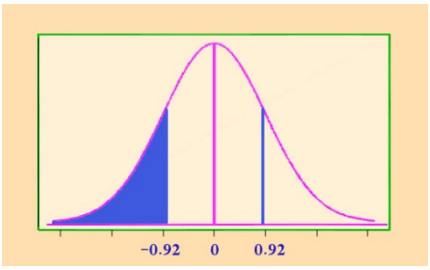
$P(Z > -0.92)$

$0.5 + 0.3212 = 0.8212$

(9.c)

$P(24000 < \overline{X} < 26000)$

$$P\left(\frac{24000-26489}{\frac{3204}{\sqrt{36}}} < \frac{\overline{X}-\mu}{\frac{\sigma}{\sqrt{n}}} < \frac{26000-26489}{\frac{3204}{\sqrt{36}}}\right)$$



$P(-4.66 < Z < -0.92)$

$= P(Z < -0.92)$

$0.5 - 0.3212 = 0.1788$