26. $\Pr(X < 3.5) + \Pr(X > 4.5)$
$= 1 - \Pr(3.5 \le X \le 4.5)$
$= 1 - \left[A\left(\frac{4.5-4}{.4}\right) - A\left(\frac{3.5-4}{.4}\right)\right]$
$= 1 - [A(1.25) - A(-1.25)]$
$= 1 - (0.8944 - 0.1056)$
$= 0.2112$

27. $\Pr(-2 \le Z \le 2) = A(2) - A(-2)$
$= 0.9772 - 0.0228$
$= 0.9544$

28. $\Pr(-2.5 \le Z \le 2.5) = A(2.5) - A(-2.5)$
$= 0.9938 - 0.0062$
$= 0.9876$

29. From Table 2 we see that $\Pr(Z \le 2) = .9772$ for standard normal Z. Solve $\frac{6-5}{\sigma} = 2$: $2\sigma = 1$, $\sigma = .5$.

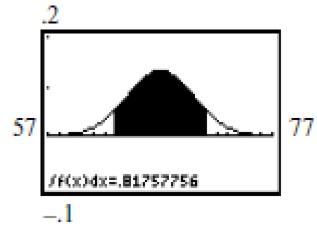
30. Since $\Pr(14.5 \le X) = .0013$ we have $\Pr(X \le 14.5) = 1 - .0013 = .9987$. From Table 2 we see that $\Pr(Z \le 3) = .9987$ for standard normal Z. Solve $\frac{14.5-10}{\sigma} = 3$: $3\sigma = 4.5$, $\sigma = 1.5$.

31. $\mu = 3.3,\ \sigma \approx .2$
$\Pr(X \ge 4) = \Pr\left(Z \ge \frac{4-3.3}{.2}\right)$
$= \Pr(Z \ge 3.5)$
$= 1 - \Pr(Z \le 3.5)$
$= 1 - 0.9998$
$= 0.0002$

32. $\mu = 16\frac{3}{4},\ \sigma = \frac{1}{4}$
$\Pr(X < 16) = \Pr\left(Z < \frac{16 - 16\frac{3}{4}}{\frac{1}{4}}\right)$
$= \Pr(Z < -3) = 0.0013$

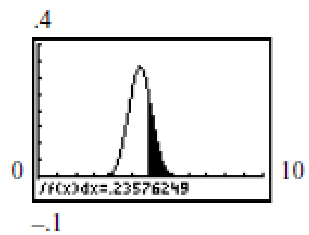
33. $\mu = 6,\ \sigma = 0.04$
$\Pr(5.95 \le X \le 6.05)$
$= \Pr\left(\frac{5.95-6}{0.04} x \le Z \le \frac{6.05-6}{0.04}\right)$
$= \Pr(-1.25 \le Z \le 1.25)$
$= 0.8944 - 0.1056$
$= 0.7888$

34. $\mu = 67,\ \sigma = 3$



$\Pr(63 \le X \le 71) \approx 0.8176$

35. $\mu = 5.4,\ \sigma = .6$



$\Pr(X > 5.832) \approx 0.2358$

36. a. $\mu = 100,\ \sigma = 16$
$\Pr(X \ge 140) = \Pr\left(Z \ge \frac{140-100}{16}\right)$
$= \Pr(Z \ge 2.5)$
$= 1 - \Pr(Z \le 2.5)$
$= 1 - 0.9938$
$= 0.0062$
$= 0.62\%$

b. $x_{90} = 100 + 16z_{90} = 100 + 16 \times 1.28 \approx 120$

37. $\mu = 7500,\ \sigma = 1000$
$\Pr(X > 9750)$
$= \Pr\left(Z > \frac{9750-7500}{1000}\right)$
$= \Pr(Z > 2.25)$
$= 1 - \Pr(Z \le 2.25)$
$= 1 - 0.9878$
$= 0.0122$

38. $\mu = 1200$, $\sigma = 160$

$$\Pr(X < 1000) = \Pr\left(Z < \frac{1000 - 1200}{160}\right)$$
$$= \Pr(Z < -1.25)$$
$$= 0.1056$$

39. $\mu = 520$, $\sigma = 75$

a. $x_{90} = 520 + 75z_{90}$
$= 520 + 75 \times 1.28$
$= 616$

b. $\Pr(-z \le Z \le z) = 0.90$
$\Pr(Z \le -z) = 0.05 \Rightarrow z_{05} \approx -1.65$

$$\frac{x - \mu}{\sigma} = \frac{x - 520}{75} = -1.65$$
$\Rightarrow x_{05} = 396.25 \approx 396$

$$\frac{x - \mu}{\sigma} = \frac{x - 520}{75} = 1.65$$
$\Rightarrow x_{95} = 643.75 \approx 644$

Between 396 and 644

c. $x_{98} = 520 + 75z_{98} = 520 + 75 \times 2.05 = 674$

40. $\mu = 300$, $\sigma = 50$

$\Pr(Z \le z) = 0.95 \Rightarrow z_{95} \approx 1.64$

$$\frac{x - \mu}{50} = \frac{x - 300}{50} = 1.64 \Rightarrow x_{95} = 382$$

They need 382 bags.

41. $\mu = 30{,}000$, $\sigma = 5000$

$\Pr(Z \le z) = .02 \Rightarrow z_{02} \approx -2.05$

$$\frac{x - \mu}{\sigma} = \frac{x - 30{,}000}{5000} = -2.05 \Rightarrow x_{02} = 19{,}750$$

19,750 miles

42. $\mu = ?$, $\sigma = 0.25$

a. $\Pr(Z > z) = 0.005 \Rightarrow z_{99.5} \approx 2.60$

$$\frac{x - \mu}{\sigma} = \frac{6 - \mu}{0.25} = 2.60$$
$\Rightarrow \mu \approx 5.35$ ounces

b. $\Pr(Z > z) = 0.99 \Rightarrow z_{01} \approx -2.35$

$$\frac{x - \mu}{\sigma} = \frac{x - 5.35}{0.25} = -2.35$$
$\Rightarrow x_{01} \approx 4.76$ ounces

43. True; As σ increases, the normal curve flattens out.

44. $\mu = 4$, $\sigma = .5$

a. $\Pr(3 \le X \le 5)$
$4 - c = 3$ and $4 + c = 5$ $\quad c = 1$

Probability: $1 - \dfrac{0.5^2}{1^2} = 0.75$ so

$\Pr(3 \le X \le 5) \ge 0.75.$

b. $$\Pr(3 \le X \le 5) = \Pr\left(\frac{3-4}{0.5} \le Z \le \frac{5-4}{0.5}\right)$$
$$= \Pr(-2 \le Z \le 2)$$
$$= 0.9772 - 0.0228$$
$$= 0.9544$$

c. The probability found using the Chebychev inequality is an estimate and can be used for any random variable. The probability found in (b) assumes the random variable is normally distributed and thus the extra information about the shape of the distribution of the random variable provides a more accurate estimate of the probability.

45. normalcdf(1,5,3,2)

NORMDIST (5,3,2,TRUE) – NORMDIST (1,3,2,TRUE)

$P(1 < x < 5)$ for x normal (3,2)

46. normalcdf(9.625,30,7.75,1.25)

1 – NORMDIST (9.625,7.75,1.25,TRUE)

$P(x > 9.625)$ for x normal (7.75,1.25)

47. normalcdf(0,1000,1200,100)

NORMDIST (1000,1200,100,TRUE)

$P(x < 1000)$ for x normal (1200,100)

48. invNorm(.99,1200,100)

NORMINV (0.99,1200,100)

inverse normal probability 0.99, mean=1200, std dev=100