For my application of normal probability distribution, I looked into solving a problem from the chapter. The exercise shown below is the solution for number 33 from Chapter 18.3.

A machine produces screws with a mean length of 2.5 cm and a standard deviation of 0.2 cm. find the probabilities that a screw produced by this machine has lengths as follows:

1. Greater than 2.7 cm
2. Within 1.2 cm standard deviations of the mean

μ = 2.5

σ = 0.2

x = 2.7

z = 2.7-2.5

0.2

z = 1

The area to the right of z = 1 is 0.8413 (appendix of the text)

1-0.8413 = 0.1587

So the probability of the machine producing a screw longer than 2.7 cm is 15.87%.

To find the probability of the screw being manufactured within the 1.2 cm standard deviation of the mean

z = 1.2

z = -1.2

Area to the left of 1.2 is 0.8849

Area to the left of -1.2 is 0.1151

0.8849-0.1151 = 0.7698

The probability the machine will manufacture a screw within the 1.2 cm of the mean is 76.98%.