4.7 Exercises.

4.1 Evaluate the following MATLAB expressions.
(a) $5 \geq 5.5$
(b) $20 > 20$
(c) $\text{xor}(17 - \pi < 15, \pi < 3)$
(d) $\text{true} > \text{false}$
(e) $\neg (35/17) == (35/17)$
(f) $(7 \leq 8) == (3/2 == 1)$
(g) $17.5 \&\& (3.3 > 2)$

4.4 The cost of sending a package by an express delivery service is $15 for the first two pounds and $5 for each pound or fraction thereof over two pounds. If the package weighs more than 70 pounds, a $15 excess weight surcharge is added to the cost. No package over 100 pounds will be accepted. Write a program that accept the weight of a package in pounds and computes the cost of mailing the package. Be sure to handle the case of overweight package.

4.5 In Example 4.3, we wrote a program to evaluate the function $f(x, y)$ for any two user-specified values $x$ and $y$, where the function $f(x, y)$ was defined as following:

$$f(x, y) = \begin{cases} 
  x + y & x \geq 0 \text{ and } y \geq 0 \\
  x + y^2 & x \geq 0 \text{ and } y < 0 \\
  x^2 + y & x < 0 \text{ and } y \geq 0 \\
  x^2 + y^2 & x < 0 \text{ and } y < 0 
\end{cases}$$

The problem was solved by using a single if construct with four code blocks to calculate $f(x, y)$ for all possible combinations of $x$ and $y$. Rewrite program \texttt{funxy} to use nested if constructs, where the outer construct evaluate the value of $x$ and the inner construct evaluate the value of $y$.

4.14 Antenna Gain Pattern. The gain $G$ of a certain microwave dish antenna can be expressed as a function of angle by the equation

$$G(\theta) = |\text{sinc}(4\theta)| \text{ for } -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$

Where $q$ is measured in radians from the boresight of the dish, and $\text{sinc}(x) = \sin(x)/x$. Plot this gain function on a polar plot with the title “Antenna Gain vs $\theta$” in bold face.