4.7 Exercises.

4.1 Evaluate the following MATLAB expressions.
   (a) \(5 \geq 5.5\)
   (b) \(20 > 20\)
   (c) xor(17–pi < 15, pi<3)
   (d) true > false
   (e) ~(35/17) == (35/17)
   (f) (7 <= 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 \textit{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

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

Where \(\theta\) 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 “\textbf{Antenna Gain vs }\theta” in bold face.