3.7 Chapter 3 Exercises

1. Create each of the following arithmetic sequences with a single line of code for each:

   (a) $1, 2, 3, 4, 5, 6, 7$
   (b) $2, 4, 6, 8, 9$
   (c) $5, 10, \ldots, 40, 45$
   (d) $-10, -7, \ldots, 29, 32$
   (e) Odd numbers from 77 to 101.
   (f) Even numbers from 60 to 40 decreasing

2. There is a quadratic formula for finding the zeros of quadratics. There are even cubic and quartic formulas. There is no such formula for quintics (5^{th} order polynomials) and higher! However, we can still estimate the zeros of a function by looking at where it appears to cross the x-axis. Use this strategy and "zoom-in" to estimate the zeros of

   $$f(x) = 13x^5 - 16x^4 - 3x^3 + 1$$

   You can plot the function over various domains, or use the `axis` function to set the window size of your plot.

3. Given an array `arr`, and assuming it is long enough, write a MATLAB expression to select the second element as well as the fourth and all remaining elements. That is, slice a subset or the array that excludes the first and third elements. For example, given the array

   ```
   >> arr = [17, 12, -43, 82, 8, 16, 32, -1, 44, 2]
   ```

   your expression would result in

   ```
   ans = 12  82  8  16  32 -1  44  2
   ```

4. Use slicing to select the sub-matrix of `M` that has non-zero elements:

   ```
   >> M =  [ 0 0 0 0 0 0 0 0 0
             0 0 1 7 0 0 0 0
             0 0 4 3 0 0 0 0
             0 0 9 2 0 0 0 0
             0 0 0 0 0 0 0 0 0 ]
   ```

5. Write the most concise MATLAB expressions you can to evaluate the summations of the following sequences:

   (a) Integers from 1 to 100.
   (b) Even numbers from 2 to 100.
   (c) $-18, -12, -6, 0, 6, 12, 18, 24$
   (d) $1.5, 4, 6.5, 9, \ldots, 49$
   (e) $0, \frac{\pi}{6}, \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \ldots, 2\pi$
   (f) Odd numbers greater than 100 and less than 1000.
   (g) All of the prime numbers less than 100.

6. Write MATLAB expressions corresponding to the following summations:

   (a) $\sum_{n=1}^{12} 4n - 1$

   (b) $\sum_{i} a_i$ where $a = \{2, 4, 6, 8, 9\}$