Assignment 10

Due: October 10, 2017

A handout related to this assignment can be found on Canvas.

Exercise 1

Consider the following function:

```python
def f(x):
    return x**2 + 3*x + 1
```

(a) Evaluate `f(2)`.
(b) Find the derivative of `f(x)` and evaluate it at `x = 2`.
(c) Find the second derivative of `f(x)` and evaluate it at `x = 2`.

Exercise 2

Consider the following equations:

(a) Solve for `x` in the equation `2x + 3 = 7`.
(b) Solve for `y` in the equation `y^2 + 4y - 5 = 0`.
(c) Solve for `z` in the equation `z^3 - 8 = 0`.

Exercise 3

Consider the following vectors:

(a) Find the dot product of `\mathbf{a} = (1, 2, 3)` and `\mathbf{b} = (4, 5, 6)`.
(b) Find the magnitude of `\mathbf{c} = (7, 8, 9)`.
(c) Find the cross product of `\mathbf{d} = (10, 11, 12)` and `\mathbf{e} = (13, 14, 15)`.

Exercise 4

Consider the following matrices:

(a) Find the determinant of `\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}`.
(b) Find the inverse of `\begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}`.
(c) Find the transpose of `\begin{pmatrix} 9 & 10 \\ 11 & 12 \end{pmatrix}`.

Exercise 5

Consider the following sequences:

(a) Find the `n`th term of the arithmetic sequence `a_n = 3 + (n-1)\cdot 2`
(b) Find the `n`th term of the geometric sequence `b_n = 1 \cdot 2^{n-1}`
(c) Find the sum of the first `n` terms of the sequence `c_n = 1/n`