**BME 6310**

**Fall 2021**

**Homework #1 – Due 11am, Monday, Sep 6, 2021**

1. Write a function that creates an *n* x *n* matrix *A* in which all the elements are 1. Then, assign *A* to *Anew* such that:



For example, if:

**, then

**.

Demonstrate that the function **[A, Anew] = new\_matrices(n),** where **n** is the size of the *A* matrix as described above, functions as it should.

1. Plot the function:

*f(x) = 3xcos2x – 2x*

and its derivative, both on the same plot, for:

-2π ≤ *x* ≤ 2π

Plot the function with a solid line, and the derivative with a dashed line. Add a legend and label the axes.

1. The area of the aortic valve, *AV* in cm2, can be estimated by the equation:



where *Q* is the cardiac output in L/min, and *PG* is the difference between the left ventricular systolic pressure and the aortic systolic pressure (in mmHg). Make one plot with two curves of *AV* versus *PG*, for 2 ≤ *PG* ≤ 60 mmHg. One curve for *Q* = 4 L/min and the other for *Q* = 5 L/min. Label the axes and use a legend.

1. Write a python/Matlab function that does something of value to your lab/design team/personal study plans/related to your career interests. Describe what your function does and why it is valuable.