BIOL 520/MATH 598 **Systems Biology** **Spring 2022**

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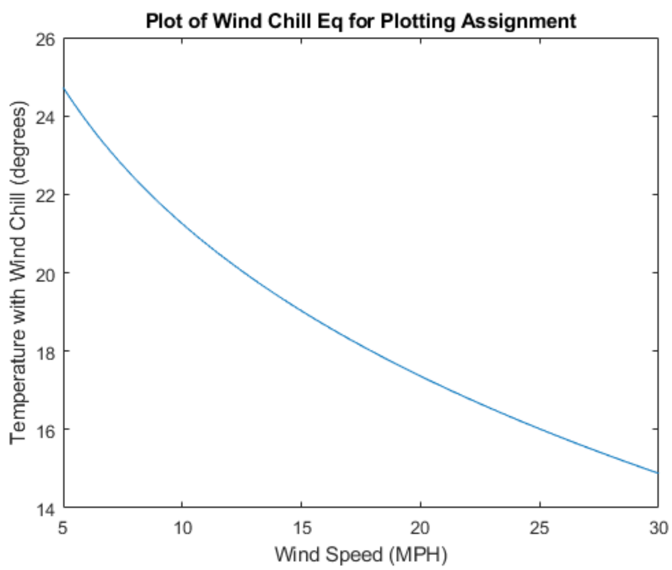
Problem 1.

(a) **[1pt]** Vectors: -5.9167

(b) **[1pt]** Plotting:



(c) **[1pt]** For Loops:

```
x = ones(20,1); %sets up vector and initializes first value to 1
for i = 2:20
    x(i) = (x(i-1)/2)+2; %iterates as desired
end
```

(d) **[1pt]** Solving ODEs (a): 245.96

(e) **[1pt]** Solving ODEs (b): $S = 13.89$ $I = 10.24$ $R = 975.86$

Problem 2.

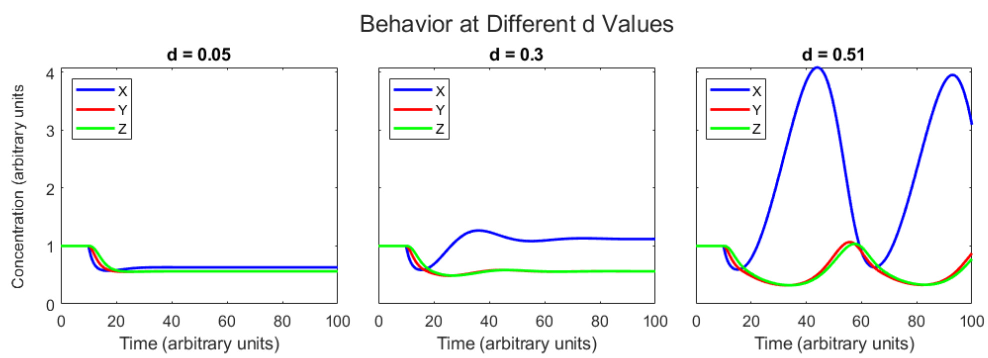
(a) **[1pt]** `tSol` has 40 elements. Using `linspace(0,30,61)`, `tSol` then has 61 elements.

(b) **[1pt]** At time = 5 (the 11th element of ySol), $X = 1$ $Y = 1$ $Z = 1$, or the initial conditions. At time = 30, $X = 0.5625$ $Y = 0.5625$ $Z = 0.5626$.

Problem 3.

(a) **[2pts]** The plots look the same because with $d = 0$, the population of Z has no effect on TF. No product is moving through the feedback pathway, so the pathway proceeds as before.

(b) **[1pts]** Selecting several values for d, the following plots were created.



These plots show the variable activity of the system under different d values. It is difficult to see the stability of the oscillations in the far right plot. Breaking the x-axis in a matlab plot is not something I know how to do off the top of my head, so I have included the following plot to demonstrate that the oscillations stabilize after 1500 time units or so.