CHEME 7770: Advanced Biomolecular Engineering
Prelim 1

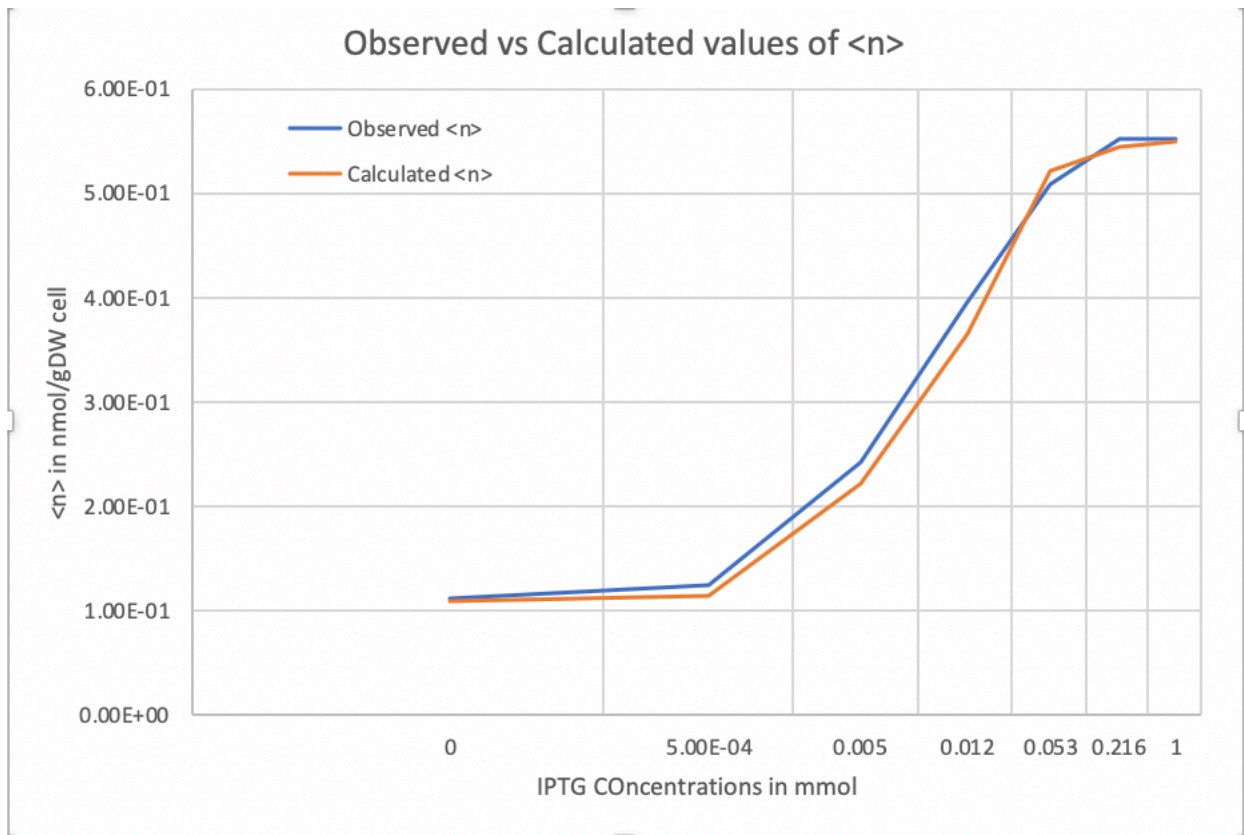**Name:** Siddharth Sheshadri Krishnan
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Problem 1:

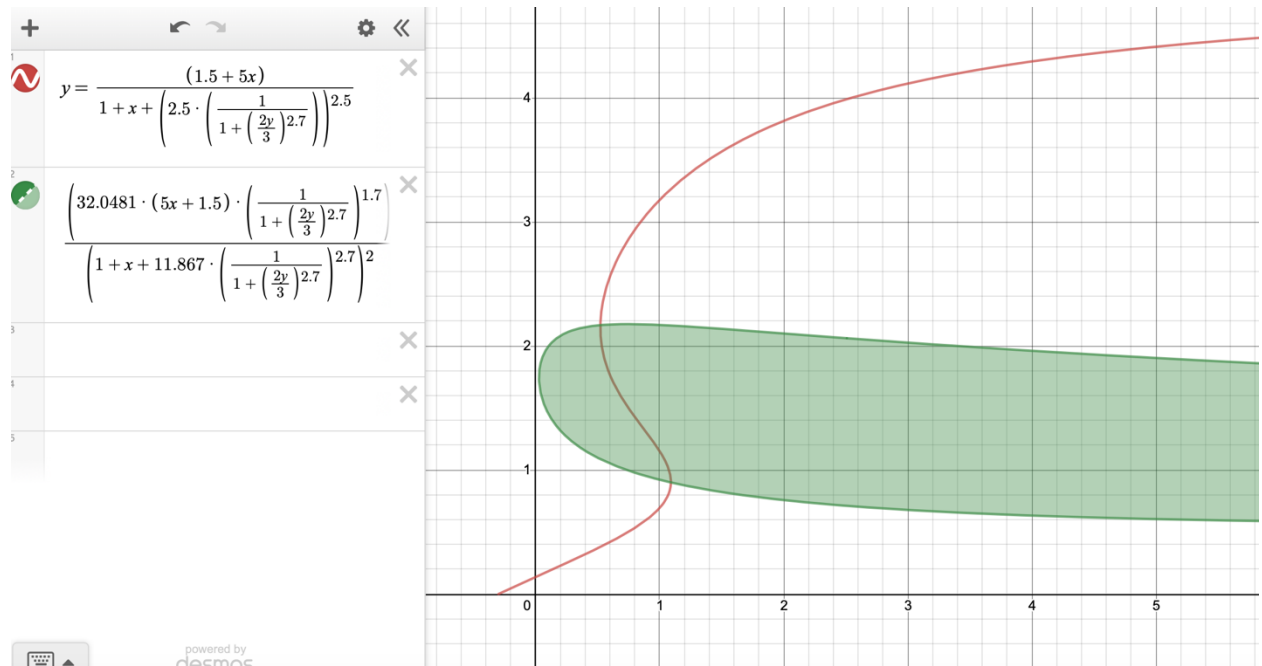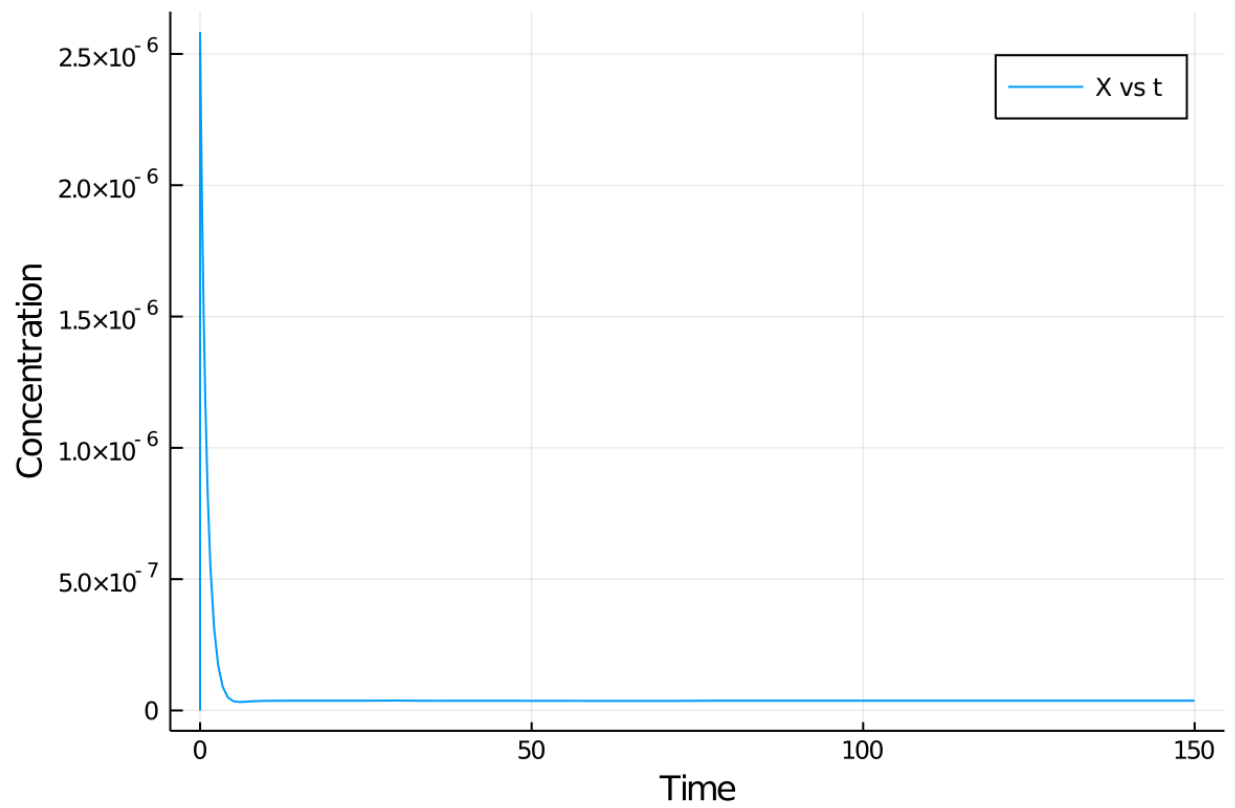Please see attached excel sheet 'sk3275_Problem1.xlsx'.

Graph:

Problem 2:

c)
Plotted using Desmos. Please see notes pdf. The red curve outside the shaded green region is for stable values of X. The curve section within is for unstable values of X. The overall curve is the full bifurcation diagram.
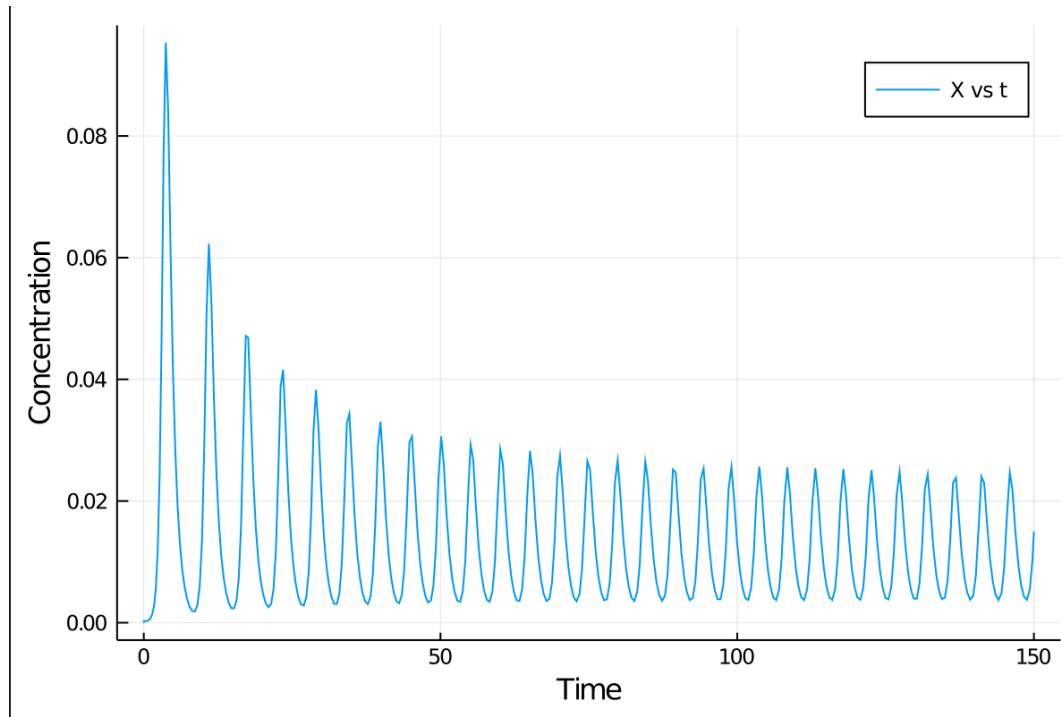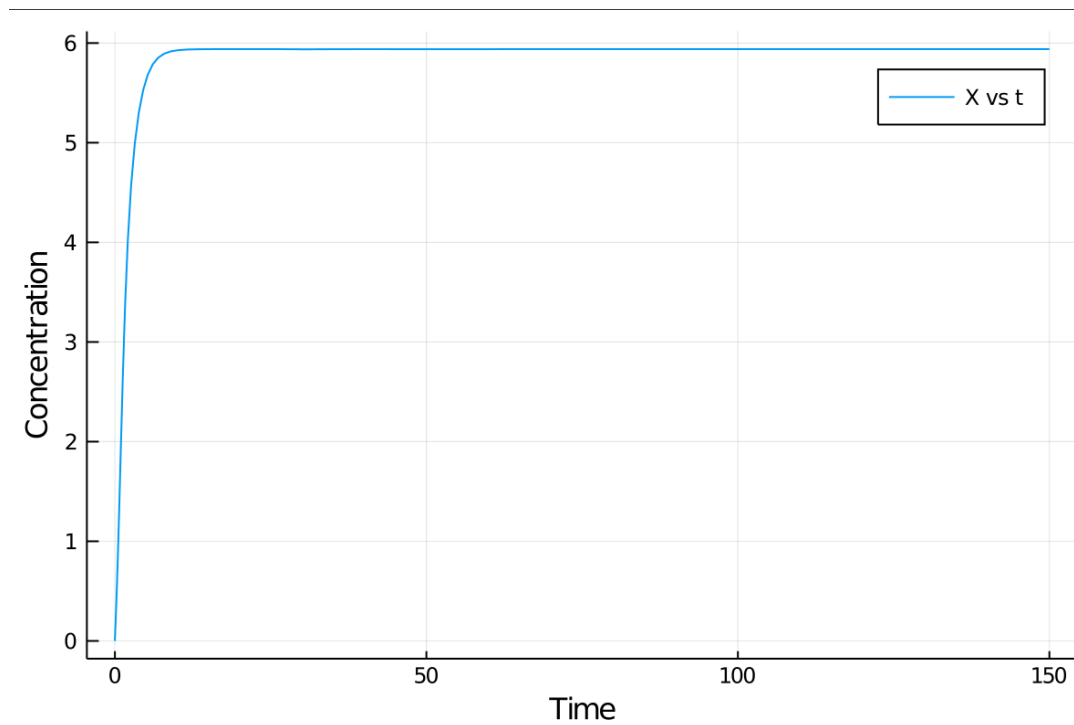
$$y = \frac{(1.5 + 5x)}{1 + x + \left(2.5 \cdot \left(\frac{1}{1 + \left(\frac{2y}{3}\right)^{2.7}}\right)\right)^{2.5}}$$

$$\frac{\left(32.0481 \cdot (5x + 1.5) \cdot \left(\frac{1}{1 + \left(\frac{2y}{3}\right)^{2.7}}\right)^{1.7}\right)}{\left(1 + x + 11.867 \cdot \left(\frac{1}{1 + \left(\frac{2y}{3}\right)^{2.7}}\right)^{2.7}\right)^2}$$

d)
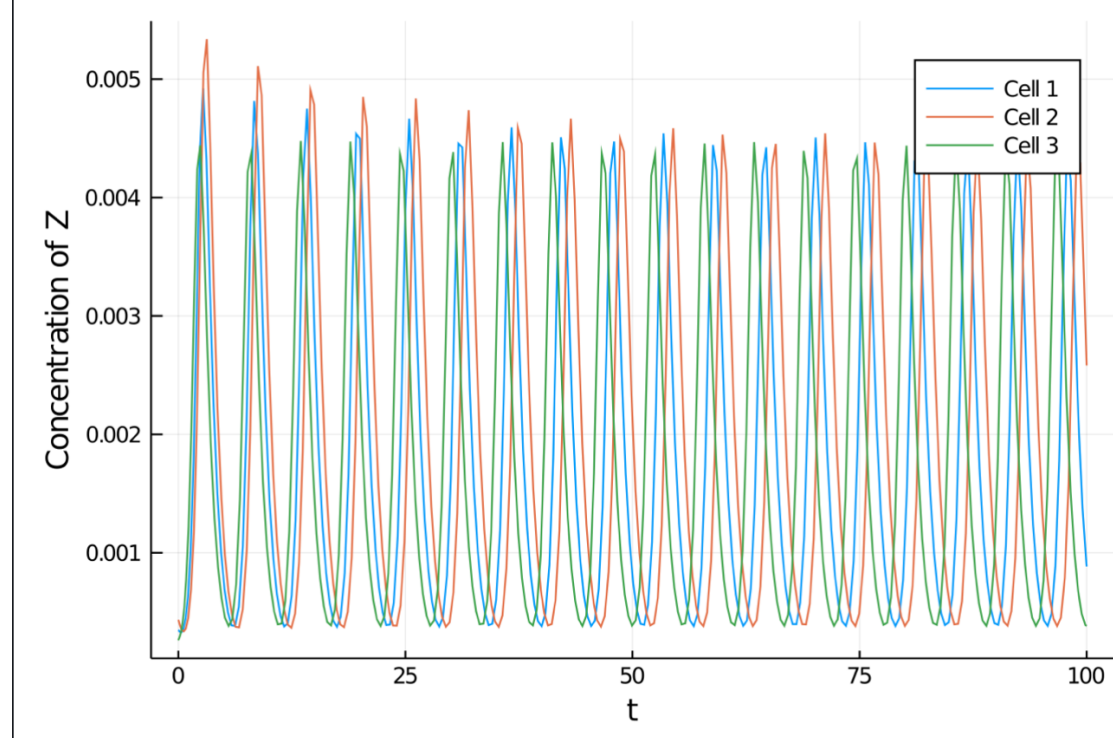
For S=0.02

For S = 10,

For S = 10E5

e)

Case (i): From S = 0.2 to S = 100

(ii) For S = 50,000 to S=100