Practice Exam # 1:

1. (10 points) Write a function that prints “It’s hot” if the temperature is greater than 85, “It’s cold” if temperature is less than 65, and “Not bad” if the temperature is between 65 and 85, inclusive. Test the function with three different temperatures.

2. (10 points) You are studying populations of penguins and marine iguanas on a beach in the Galapagos. Over five years, the penguin population at your study site has been 62, 93, 75, 56 and 76. In the same years, the marine iguana population has been 34, 21, 15, 25 and 34. Plot the system’s states in penguin-marine iguana space, making the points green and large.

3. (10 points) The simulation script below has five errors. Correct the errors and explain what each line does in a comment.

```python
var("N,P")
t = srange(0,100,0.1)
sol=desolve_odeint([0.5*N - 0.01*N*P, 0.5*0.01*N*P - 0.2P], ics=[50,75], dvars=[N,P], times=t1)
list_plot((t, sol[:,0])) + plot(zip(t,sol[:,1]), color="red")
```

4. (10 points) Write a script\(^2\) that calculates the factorial of an integer \( n \) (written \( n! \)). To calculate a factorial, we take the number, \( n \), and multiply it by all of the integers between 1 and \( n \), inclusive. For example, 2! is 2 \times 1 = 2 and 3! = 3 \times 2 \times 1 = 6. Test the script with two different values of \( n \).\(^3\)

\(^2\) A script is just code that is not in a function.

\(^3\) This factorial problem is similar to other problems we might ask on the exam, but a bit harder.