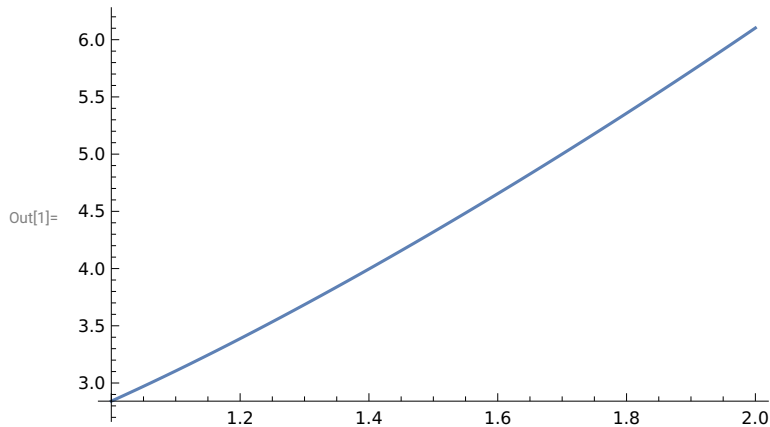# Sample Lab
John Smith
Math 251: Calculus I

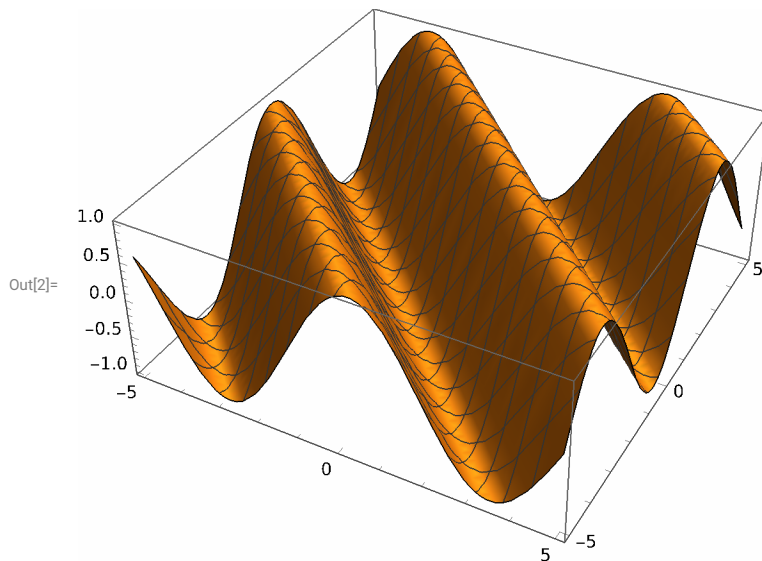This is a sample lab of the Calculus I class.

Problem 1: In this problem, we will plot the graph of function $f(x) = x^2 + \sin x + \dfrac{1}{x} + e^x + \ln x$ on the interval $[1,\ 2]$.

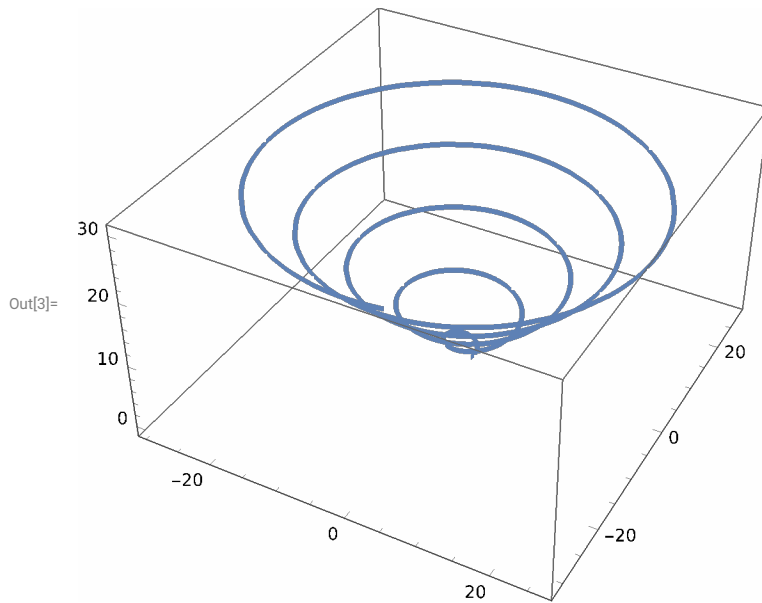In[1]:= `Plot[x^2 + Sin[x] + 1/x + Log[x], {x, 1, 2}]`

Out[1]=

Problem 2: In this problem, we will plot the graph of function $f(x,\ y) = \sin(x+y)$ on the square $[-5,\ 5] \times [-5,\ 5]$.

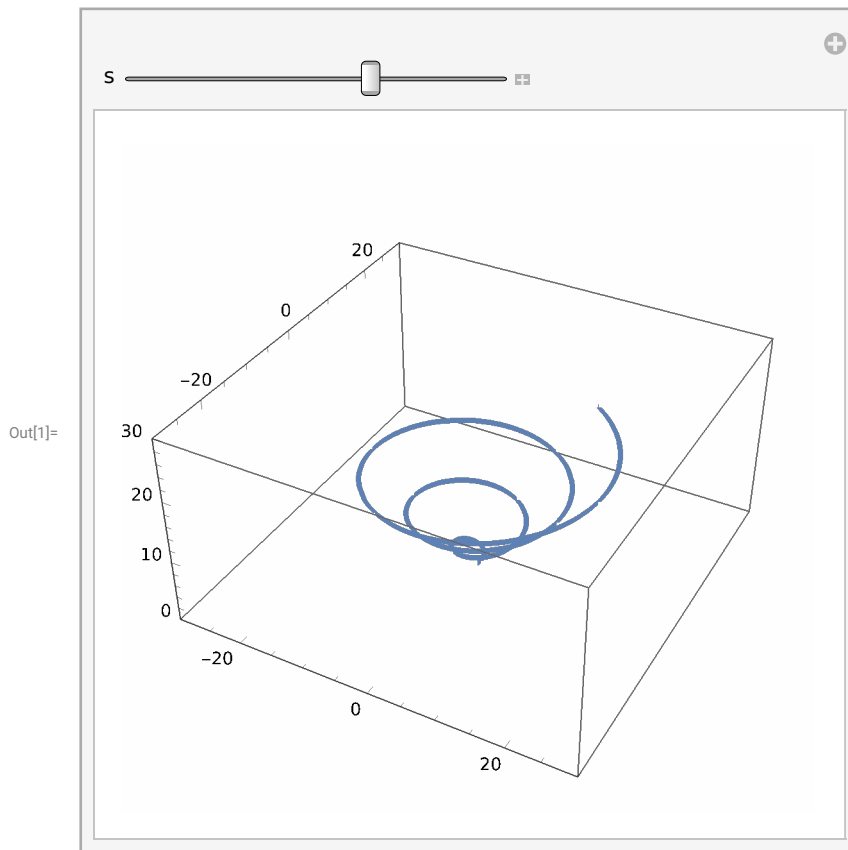In[2]:= `Plot3D[Sin[x + y], {x, -5, 5}, {y, -5, 5}]`

Out[2]=

Problem 3: We will visualize the curve $r(t) = \left(t \cos t,\ t \sin t,\ t\right)$ where $0 \le t \le 30$:

In[3]:= `ParametricPlot3D[{t * Cos[t], t * Sin[t], t}, {t, 0, 30}]`

Out[3]=

We can animate the curve too.

In[1]:= `Manipulate[ParametricPlot3D[{t * Cos[t], t * Sin[t], t},`
`{t, 0, s}, PlotRange → {{-30, 30}, {-30, 30}, {0, 30}}], {s, 0.1, 30}]`

Out[1]=

In[8]:=

What is the population of La Grande Oregon?

Out[8]= 13 026 people

In[9]:=

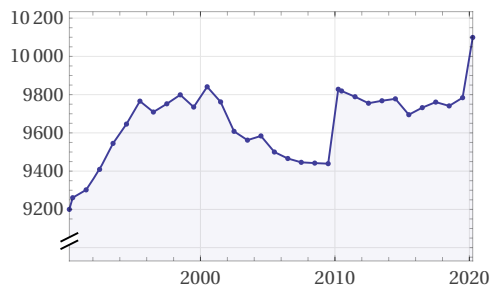**What is the population of Baker City Oregon?**

Input interpretation:

Baker City, Oregon	city population

Result:

10 099 people (country rank: $\approx 4472^{nd}$) (2020 estimate)

Population history: Log scale

(from Apr 1990 to Apr 2020)

(in people)

Out[9]=

Urban area population: Show cities

9605 people (Baker City, OR urban area)

(2000 estimate)

Nearby cities: Show metric   More

Nampa, Idaho	104 miles southeast	83 930 people
Boise, Idaho	114 miles southeast	212 303 people
Portland, Oregon	241 miles west-northwest	603 106 people

(straight-line distances between city centers)

Comparisons:

$\approx 0.83 \times$ undergraduate enrollment in the University of Cambridge in 2018 (12 163 people)

$\approx 72 \times$ Dunbar's number (100 to 230 people)

WolframAlpha