Math 151 Lab 2

Use Python to solve each problem.

1.

(a) Sticky Chin's Ice Cream shop uses an ice cream cone that has a slant height of 4 inches and an angle of 30° (see figure below). Given the cone is full and the ice cream above the cone is a hemisphere, find the volume of the ice cream. Give your answer as a decimal approximation using **evalf**.

(b) Suppose Sticky Chin's wants to design a cone with the same angle in such a way that one cup (14.5 cubic inches) of ice cream is served. Find the slant height needed for the cone.

2. Given the function

$$f(x) = x + \frac{1}{x^2 - 1}$$

(a) Plot the function on the domain $x \in [-4, 4]$ and range $y \in [-10..10]$ (use the **ylim** option in your plot command to set the range).

(b) Based on the graph, in print statements, state the vertical asymptotes of f and the behavior of f on each side (use "oo" for infinity where applicable). Your output should look like the following (given in the Jupyter template):

The vertical asymptotes are _____
As x approaches _____ from the _____, f(x) approaches _____
(etc...)

3. Recall that a circle with center (x_0, y_0) and radius r can be plotted parametrically using the equations

$$x = x_0 + r\cos(t)$$
$$y = y_0 + r\sin(t)$$

   (a) Use the **plot_parametric** command to plot two circles on the same axes: one centered at the origin with radius 7, the other centered at (3, 4) with radius 5. (NOTE: the scale of the plot will mean they don't look like circles; do not worry about this).

   (b) Using s instead of t for the equations of the second circle, set the x components of both circles equal to each other and the y components of both circles equal to each other. Solve these equations for t and s, then substitute back into the appropriate equations to find the points of intersection of the circles.