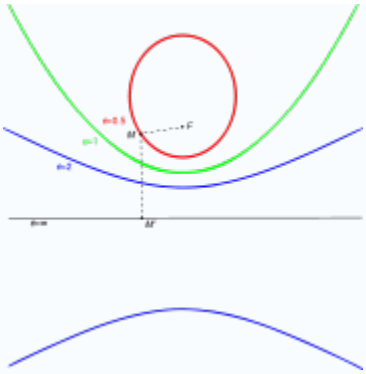
FOCUS QUESTION #5
CONICS

- Please submit your answers in Course Compass under button CANVAS
- All work must be demonstrated clearly and support must be given for answers.
- These **must be typed in Word**, using ***MathType*** or an ***Equation Editor*** when necessary. Include **graphs/drawings with technology.** There should not be any handwritten parts in your submission. Scanned documents are difficult to read and not accepted

Eccentricity (mathematics): From Wikipedia, the free encyclopedia



All types of conic sections, arranged with increasing eccentricity. Note that curvature decreases with eccentricity, and that none of these curves intersect.

In mathematics, **eccentricity** is a parameter associated with every conic section. It can be thought of as a measure of how much the conic section deviates from being circular. (Or, in lay men's terms, how "not round" it is.) In particular,

- The eccentricity of a circle is zero.
- The eccentricity of an (non-circle) ellipse is greater than zero and less than 1.
- The eccentricity of a parabola is 1.
- The eccentricity of a hyperbola is greater than 1 and less than infinity.
- The eccentricity of a straight line is 1 or ∞, depending on the definition used.

The eccentricity e of an **ellipse** is given by:

$$e = \frac{\sqrt{a^2 - b^2}}{a} = \frac{c}{a}$$

Farthest Planet From the Sun

Both Neptune and Pluto travel around the sun in elliptical orbits. For Neptune's orbit, a = 30.10 and for Pluto's orbit a = 39.44, where the variable a represents the planet's average distance from the sun in astronomical units. (One astronomical unit equals 93 million miles.) The value of the variable a also corresponds to half the length of the major axis. Pluto has highly eccentric orbit with e = 0.249, and Neptune has a nearly circular orbit with e = 0.009.

1. Calculate the value of c for each planet's orbit.

2. Position the sun at the origin of the xy-plane. Find the coordinates of the center of Neptune's orbit and the coordinates of the center of Pluto's orbit. Assume that the centers lie on the positive x-axis.

3. Find equations for Neptune's orbit and for Pluto's orbit.

4. Graph both orbits in the same xy-plane. Create a very detailed graph please.

5. Is Pluto always the farthest planet from the sun? Explain. This requires mathematical analysis and some research. I expect a paragraph explanation.