FIGURE C

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GREETINGS CONSULTANT:

Thank you for accepting this position with NASA in the Catherine Johnson computing center. To begin, we are in need of you to model some planetary movement for us. Please see the description below. This should take approximately 1 work day.

BACKGROUND:

In the early 1600s, Johannes Kepler (1571-1630) studied the motions of the planets to find a good mathematical model for them. In 1619, he published his third law of planetary motion, which says how the orbital periods of the planets are related to their distances from the sun. In Kepler's time, Uranus and Neptune had not been discovered, but here is the data for all 8 planets:

TASK:

Use our desmos program to plot the distance (x) and period (y) of each planet, and find a polynomial model that fits the data as well as possible. You may have to experiment with both the degree of your polynomial function and the number of terms.

Make another plot that uses the square root of each distance instead, and find a polynomial model that fits those points as well as possible.

Moon	Distance	Period
mimas	185.5	0.942
Enceladus	238.2	1.37
Tethys	294.6	1.888
Dione	377.4	2.737
Rhea	527.0	4.518
Titan	1,221.8	15.945
Hyperion	1,481.1	21.277
Iapetus	3,561.3	79.33

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REFLECT:

A computer could be programmed to run the task. That is not why we hired you. Your critical thinking skills are legendary. Please help us with answering the following:

1. Which model do you think is best for each of your graphs?
2. Neptune has a lot of moons. Look up the periods and distances of some of them(cite your sources), and use that data to make a polynomial model of the relationship between period and distance for Neptune's moons.
3. Use your model to predict the period of another one of Saturn's moons using the radius of its orbit.
4. How good was the prediction? What are some possible sources of error?

RUBRIC:

As this is your first assignment in NASA, we would like to inform you of how you will be evaluated for future projects. Your slides or powerpoint presentation for the administrators should include the following:

6 points	8 points	4 points	4 points	1 point	1 point	1 point
Labelled pictures of the 3 graphs from desmos	An explanation of the best model for each and why.	Your prediction using your model for one of Jupiter's moons and why you feel it is a good model.	An evaluation of your prediction (good or bad and why. How might you improve the formula?)	A colorful design to the professional presentation	No grammatical errors	Sources cited

End Behavior (Part 1)

Lesson Synthesis

Bonus Opportunity!!! Get someone to help you make a video of yourself doing the below for at least 4 different functions and submit!

Here is an example!

Due by 10/16

Stand up to play a game. Wiggle your arms and do some stretches.

1. A series of polynomial equations will be displayed one at a time.
2. After an equation is displayed, there will be a brief quiet think time to identify the end behavior. Give a hand signal when you are ready.
3. When you hear "Pose!" (or a different word chosen by the class), use your arms to show the end behavior of the function. For example, for $y = x^2$, you put both hands up in the air. For something like $y = x^3$, you have your left arm down and your right arm up.