Name: _____

In order to better understand the glass frog's fertilization habits, scientists performed a study and recorded the average number of frog eggs over the span of 44 months.

Scientists model number of frog eggs over 44 months with the function
$f(x) = .2319x^4 - 20.236x^3 + 540.05x^2 - 4378.6x + 10604$, where $f(x)$ represents the number of frog eggs, on the xth month since the scientist started recording the data.

a) Use the following window in your graphing calculator to sketch the shape of the function: [0, 50, 5, -5000, 20000, 5000]
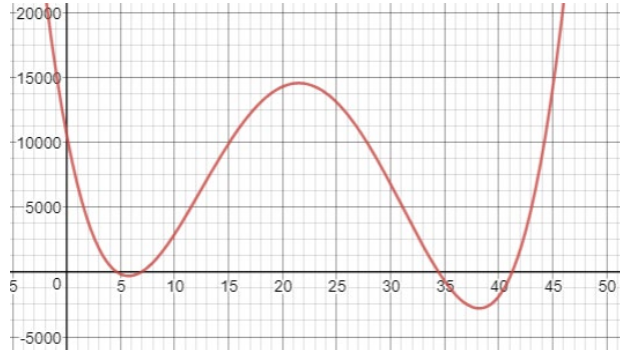
b) Determine the domain and range of the function $f(x)$.
Write your answers using interval notation.

Domain: $(-\infty, \infty)$ – Since $f(x)$ is a polynomial, the domain will always be all real numbers.

Range: $(-2807.118, \infty)$ – The lower bound is -2807.118 because that is the minimum y-value is at the absolute minimum (38.198, -2807.118). The upper bound is infinity because both ends of the function approach infinity.

c) Determine the practical domain and range of $p(x)$ in the context of the problem. Write your answers using interval notation. Explain how you know.

Domain: [0,44] – The domain is a closed interval between 0 and 44 months because the scientist and recording data for 44 months.

Range: [0,14540] – The range is a closed interval between 0 and 14540. The lower bound is 0 because practically it does not make sense for the number of frog eggs to be below 0. The upper bound is 14540 because the maximum y-value between 0 and 44 months is at the relative maximum (21.5, 14540.503).

Additional Practice: Write each of the following in interval notation.

1. $y \geq 2$

2. $-4 < x \leq 10$

3. $x \in \mathbb{R}$

4. $y < 1 \ or \ y > 5$

5. *Joe has a summer job that pays $7.00 an hour and he works between 15 and 35 hours every week. His salary can be modeled by the equation $S = 7h$, where S is his weekly salary and h is the number of hours he worked in a week.*

    a. Sketch the shape of the function.

    b. Determine the domain and range of the function S. Write your answers using interval notation.

    c. Determine the practical domain and range of S in the context of the problem. Write your answers using interval notation. Explain how you know.

6. *The surface area of a cube can be found using the formula $A = 6s^2$, where A is the surface area of the cube a s represents the length of one edge. Your geometry teacher wants you to find the surface areas of cubes that have a length of at least 5 inches.*

    a. Sketch the shape of the function.

    b. Determine the domain and range of the function A. Write your answers using interval notation.

    c. Determine the practical domain and range of A in the context of the problem. Write your answers using interval notation. Explain how you know.