

This activity is not for a grade, but please try your best.

Name: _____

1. Let $y = f(x)$ be a function defined by $2x^2 + 2xy - (x + y)^2 = 0$ and $y \geq 0$.
 - (a) Solve for y in terms of x .
 - (b) What is the domain of $f(x)$?
 - (c) What is the range of $f(x)$?
 - (d) Is $f(x)$ even, odd, or neither?
2. Recall that the difference quotient of a function $f(x)$ is $\frac{f(x+h)-f(x)}{h}$. Evaluate the difference quotient for each of the following functions:
 - (a) $f(x) = x$
 - (b) $f(x) = x^2$
 - (c) $f(x) = x^3$
 - (d) $f(x) = x^4$

Consider the first terms (without an h) of each difference quotient. Do you see a pattern? Can you guess the first term of the difference quotient of $f(x) = x^5$ without computing it?

3. Let P be the perimeter of the pill shape in figure 1. Calculate the area $A(w, P)$ as a function of P and the width w .



Figure 1: A pill shape formed by appending two semicircles to opposite ends of a rectangle.

4. Find an expression for $f(x)$ given its type and points that lie on the graph.

(a) linear; $f(0) = 3$, $f(1) = 5$

(b) quadratic; $f(-2) = 2$, $f(2) = 2$, $f(3) = 7$

(c) cubic; $f(-2) = -2$, $f(0) = 0$, $f(2) = 2$, $f(4) = 8$

Do you see a pattern between the number of points needed and the degree of the polynomial? How many points would we need for a quartic graph?