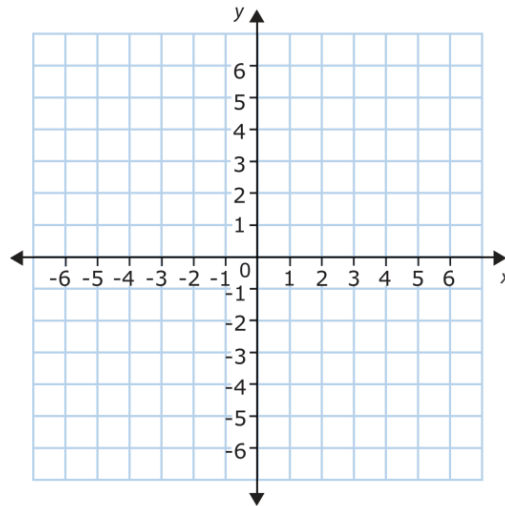
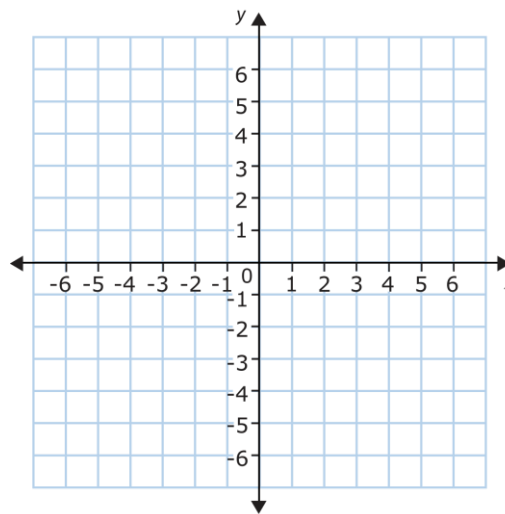


Graph the intersection of the following inequalities.

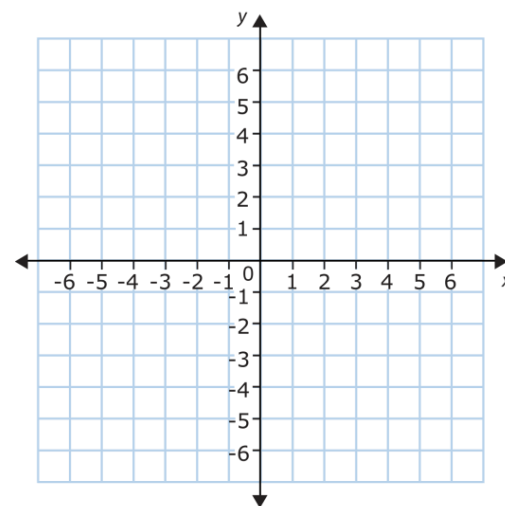
1.
$$\begin{cases} y > x^4 + 4x^3 + 4x^2 \\ y \leq -2^x + 3 \end{cases}$$



2.
$$\begin{cases} y < x(x-2)(x+1)^2 \\ y > -x(x-2)(x+1)^2 \end{cases}$$



3.
$$\begin{cases} y \leq \frac{1}{2}|x-1| \\ y \geq 0 \\ y \leq x^3 + x^2 - 9x - 9 \end{cases}$$



4. Consider the degree 7 polynomial $a_7x^7 + a_6x^6 + a_5x^5 + a_4x^4 + a_3x^3 + a_2x^2 + a_1x^1 + a_0$ where coefficients, a_0, \dots, a_6 , are all real numbers. Depending on exactly what each coefficient equals, this polynomial may cross the x -axis a different number of times.

a) What is the largest number of x -intercepts this polynomial could have. Explain how you know that it could not have more intercepts.

b) What is the smallest number of x -intercepts this polynomial could have. Explain how you know it could not have fewer intercepts.

5. Now consider the degree 6 polynomial $c_6x^6 + c_5x^5 + c_4x^4 + c_3x^3 + c_2x^2 + c_1x^1 + c_0$. What is the smallest number of x -intercepts this polynomial could have? Make a quick sketch to support your answer.