

Characteristics of Polynomial Functions


Interval Notation is a way of writing subsets of real numbers.


Braces  $\{ \}$  define a set, but that set is limited to the specific elements named within.

Brackets  $[ ]$  indicate that all numbers INCLUDING the given values are in the interval.

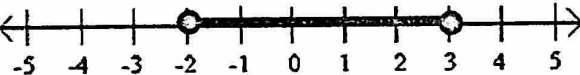
Parentheses  $( )$  indicate that all numbers BETWEEN the given values are in the interval.

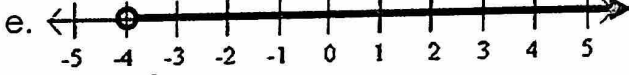
Ex 1: Use interval notation to describe the inequality shown or described.

a.  $x < 5$    $(-\infty, 5)$

b.  $x \geq -2$    $[-2, \infty)$

c.  $-3 < x \leq 4$   $(-3, 4]$

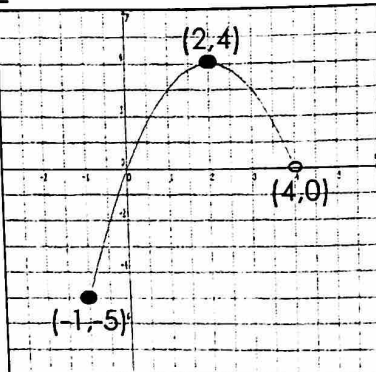
d.   $[-2, 3]$

e.   $(-4, \infty)$

We'll use interval notation to describe the domain and range of functions.

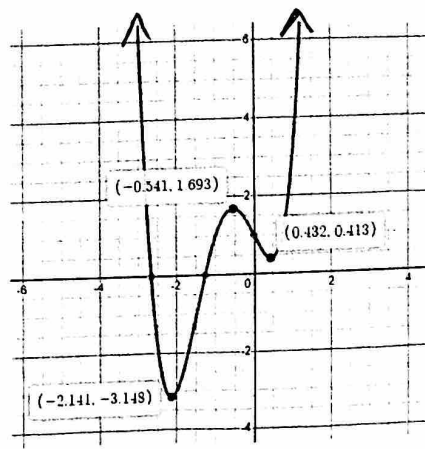
Domain		
<b>Define:</b> All possible values of x	<b>Think:</b> How far does the graph go, from <b>left to right</b> ?	<b>Write:</b> [least x-value, greatest x-value] *use ( ) with $-\infty$ and $\infty$
Range		
<b>Define:</b> All possible values of y	<b>Think:</b> How far does the graph go, from <b>bottom to top</b> ?	<b>Write:</b> [least y-value, greatest y-value] *use ( ) with $-\infty$ and $\infty$

Ex 2:

a. 

left, right  
Domain:  $[-1, 4]$

bottom, top  
Range:  $[-5, 4]$

b. 

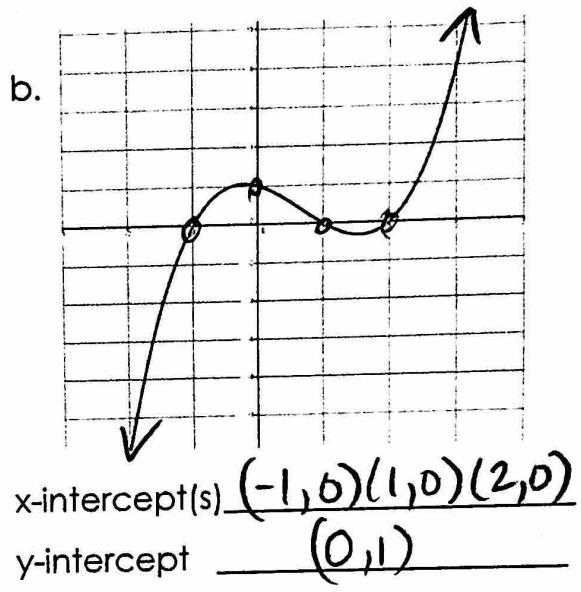
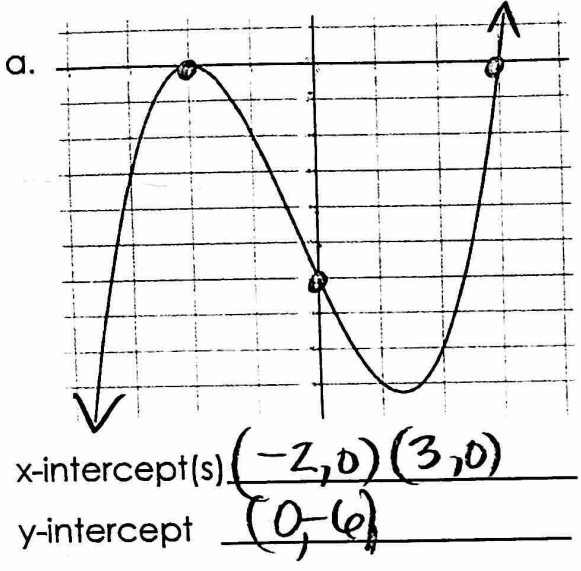
left, right  
Domain:  $(-\infty, \infty)$

Range:  $[-3.148, \infty)$

\*For polynomial functions the DOMAIN will ALWAYS be  $(-\infty, \infty)$ .

x-intercept	y-intercept
<ul style="list-style-type: none"> <li>The x-coordinate of the point(s) where the graph crosses the x-axis.</li> <li><math>(x, 0)</math></li> <li>Also known as ZEROS or Roots</li> <li>Can be calculated by substituting <b>zero for y</b>.</li> <li>A polynomial of degree <math>n</math> can have at most <math>n</math> real zeros</li> </ul>	<ul style="list-style-type: none"> <li>The y-coordinate of the point where the graph crosses the y-axis.</li> <li><math>(0, y)</math></li> <li>Can be calculated by substituting <b>zero for x</b>.</li> <li>Can a function have more than one y-intercept? <b>Nope</b></li> </ul>

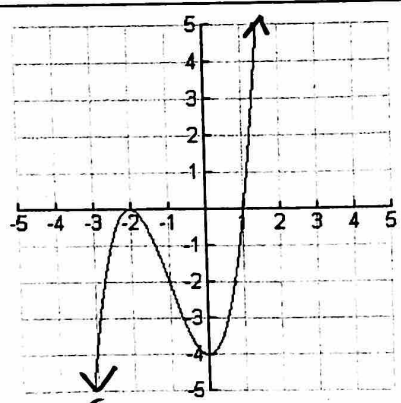
Ex 3: Identify the x- and y- intercepts.



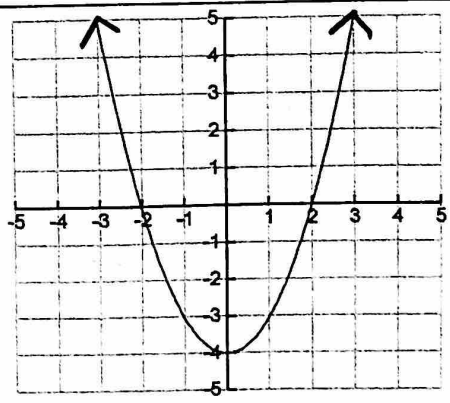
Ex 4: Find the y-intercepts:  $(0, -1)$   
a.  $y = 3x^4 + 5x^2 - 1$   
 $y = 3(0)^4 + 5(0)^2 - 1 = -1$

b.  $f(x) = -2x^2 - 3x + 15$   
 $-2(0)^2 - 3(0) + 15 = 15$   $(0, 15)$

Putting it all TOGETHER



Domain:  $(-\infty, \infty)$   
Range:  $(-\infty, \infty)$   
X-Intercepts:  $(-2, 0) (1, 0)$   
Y-Intercept:  $(0, -4)$



Domain:  $(-\infty, \infty)$   
Range:  $[-4, \infty)$   
X-Intercepts:  $(-2, 0) (2, 0)$   
Y-Intercept:  $(0, -4)$