

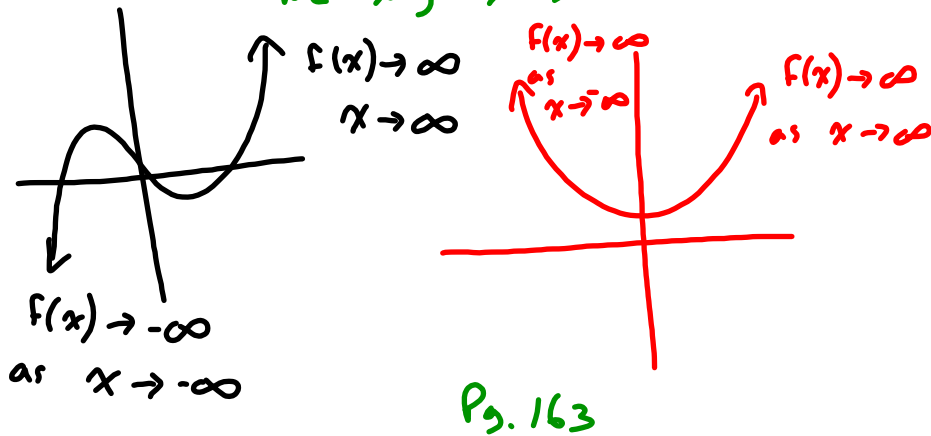
LT16: I can determine the end behaviors of functions.

3.5 End Behavior

- Describes what the y-values do as $|x|$ becomes greater & greater.

When x becomes greater & greater, we say $x \rightarrow \infty$

When x becomes more negative, we say $x \rightarrow -\infty$



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In general, the end behavior of any polynomial function can be modeled by the function comprised solely of the term with the highest power of x and its coefficient. Suppose for $n \geq 0$

$$p(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x + a_0$$

Then $f(x) = a_n x^n$ has the same end behavior as $p(x)$. The following table organizes the information for such functions and provides an example of a function displaying each type of end behavior.

End Behavior of Polynomial Functions	
$p(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x + a_0, n > 0$	
<p>a_n positive, n: even</p> <p>$p(x) = x^2$</p>	<p>a_n negative, n: even</p> <p>$p(x) = -x^2$</p>
<p>a_n positive, n: odd</p> <p>$p(x) = x^3$</p>	<p>a_n negative, n: odd</p> <p>$p(x) = -x^3$</p>

Ex $f(x) = -5x^3 + 4x^2 - 2x + 4$

$f(x) \rightarrow \infty$ as $x \rightarrow -\infty$ $f(x) \rightarrow -\infty$ as $x \rightarrow \infty$