

# Graphing and Writing Polynomial Functions

End Behavior	Positive Leading Coefficient	Negative Leading Coefficient
<b>Odd Degree Polynomial</b>	as $x \rightarrow -\infty, f(x) \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow \infty, f(x) \rightarrow \underline{\hspace{2cm}}$	as $x \rightarrow -\infty, f(x) \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow \infty, f(x) \rightarrow \underline{\hspace{2cm}}$
<b>Even Degree Polynomial</b>	as $x \rightarrow -\infty, f(x) \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow \infty, f(x) \rightarrow \underline{\hspace{2cm}}$	as $x \rightarrow -\infty, f(x) \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow \infty, f(x) \rightarrow \underline{\hspace{2cm}}$

**Fundamental Theorem of Algebra:** Any polynomial of  $n$  degree has  $n$  roots.

To sketch the graph of a polynomial, determine the end behavior, find all of the roots (including multiplicities and non-real roots), and find the y-intercept.

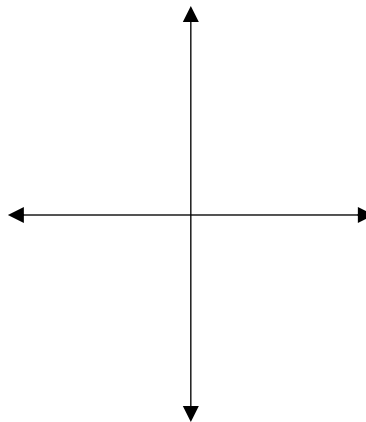
$$P(x) = x(x+2)^2(x^2+9)$$

Type:

End behavior:

y-intercept:

x-intercepts:



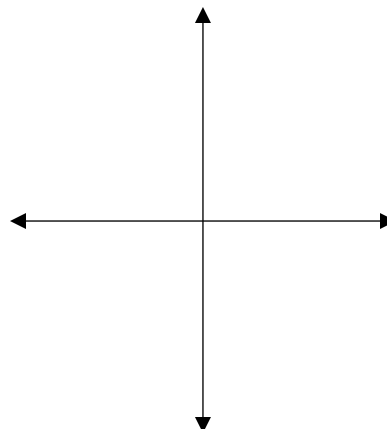
$$f(x) = -3(x-4)^2(x+5)(x+1)$$

Type:

End behavior:

y-intercept:

x-intercepts:



Determine the function that fits the graph.

