Warm Up

Use technology to evaluate each polynomial expression for $x = 5$.

1. $x^3 + 10x^2 - 1$

2. $2x^5 - 6x^4 - x + 2$

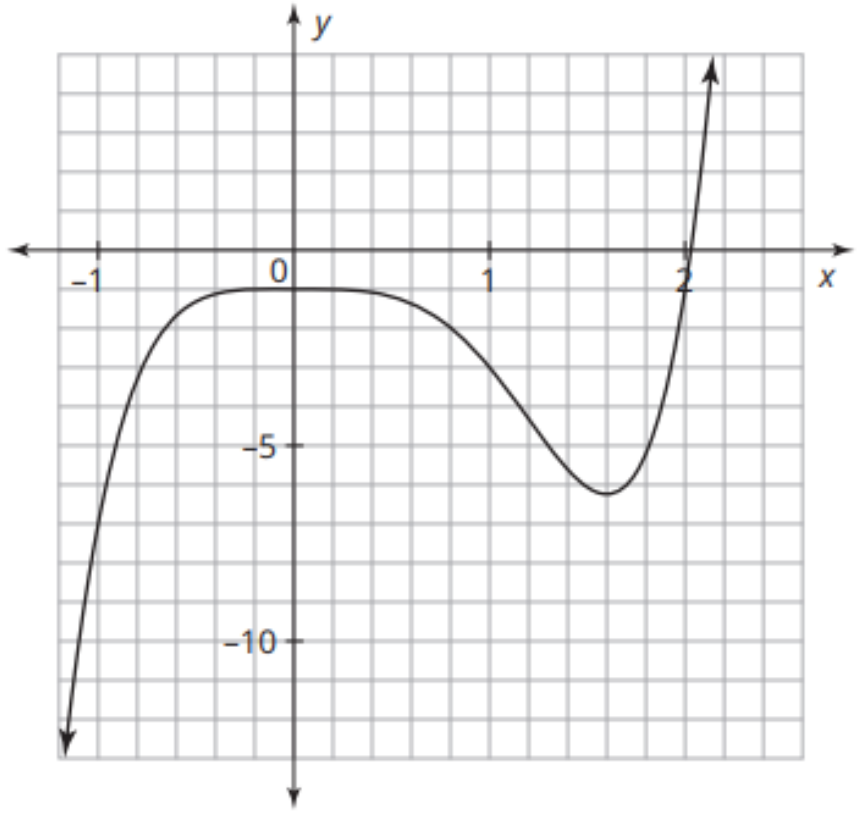
3. $\frac{2x^5 - 6x^4 - x + 2}{x^3 + 10x^2 - 1}$

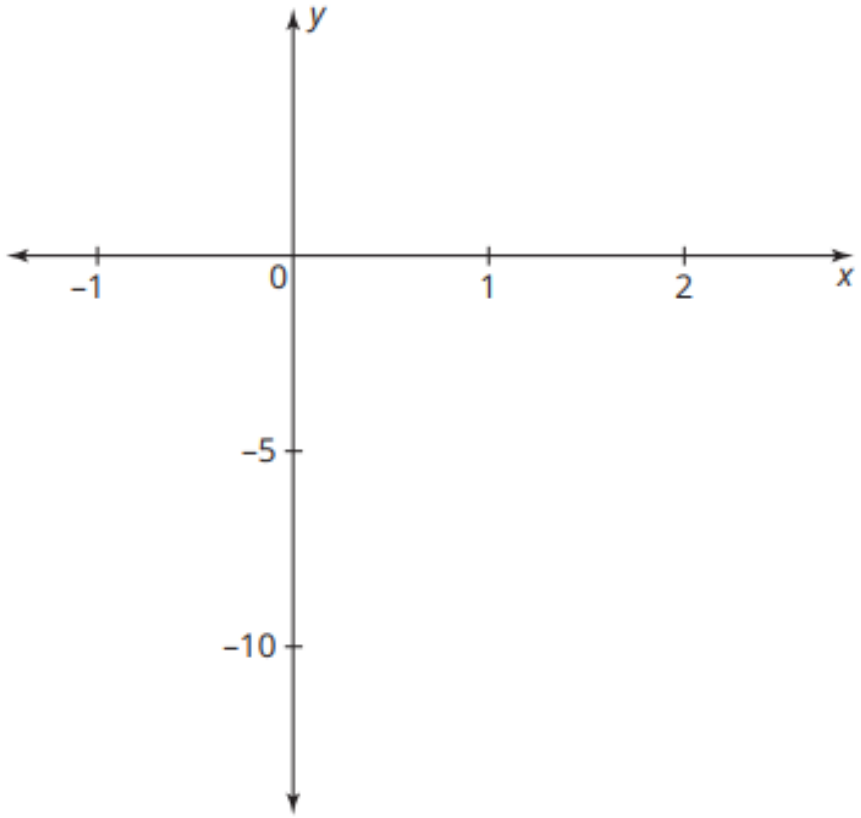
Learning Goals

- Compare polynomial functions by their key characteristics.
- Compare polynomial functions using multiple representations.

1. **Given each polynomial function and its graph, determine a function of lesser degree using the same coefficients. Write the equation and then use technology to sketch the graph of the function.**

a.

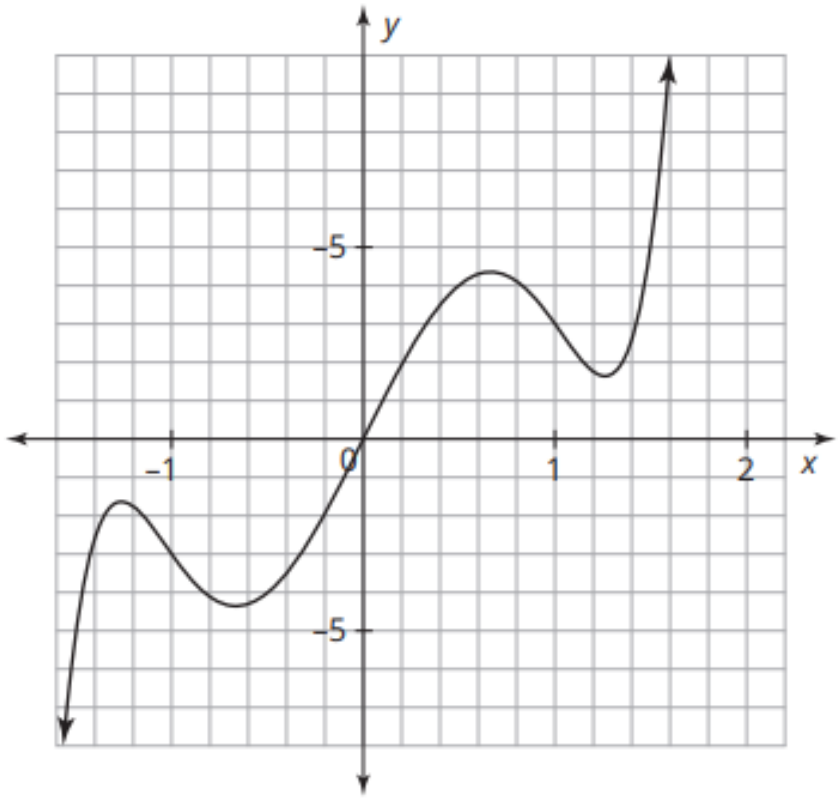


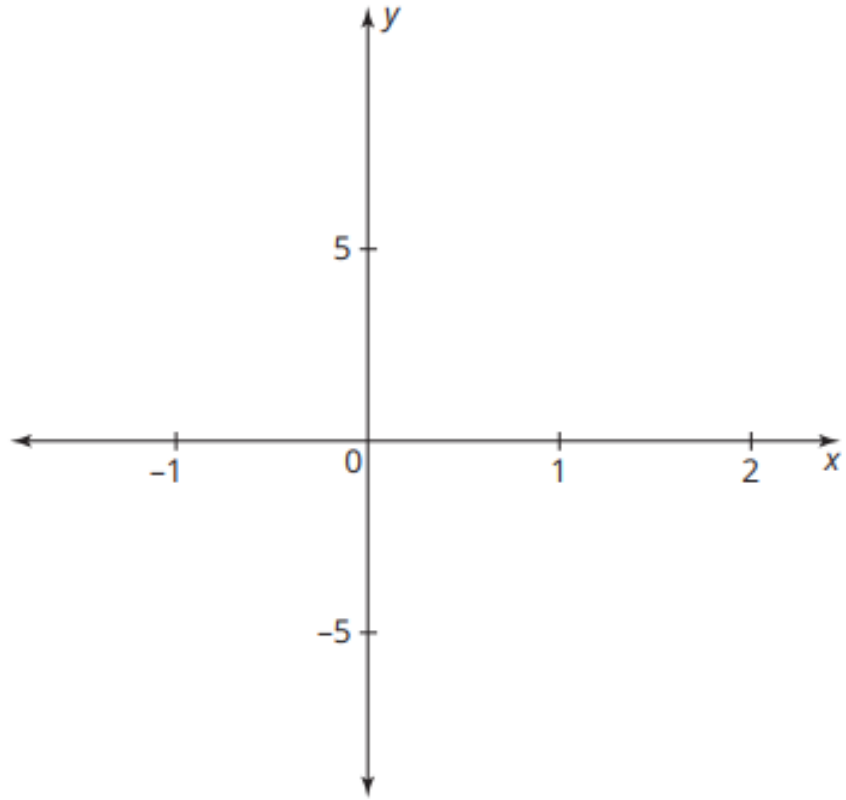


$f(x) = 2x^5 - 4x^4 - 1$

Function of lesser degree: _____

b.

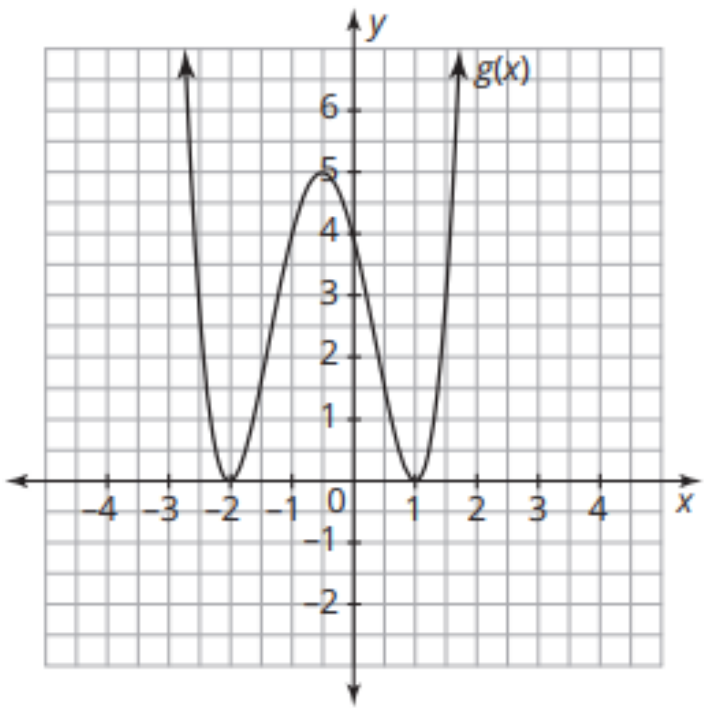




$g(x) = x^7 - 8x^3 + 10x$

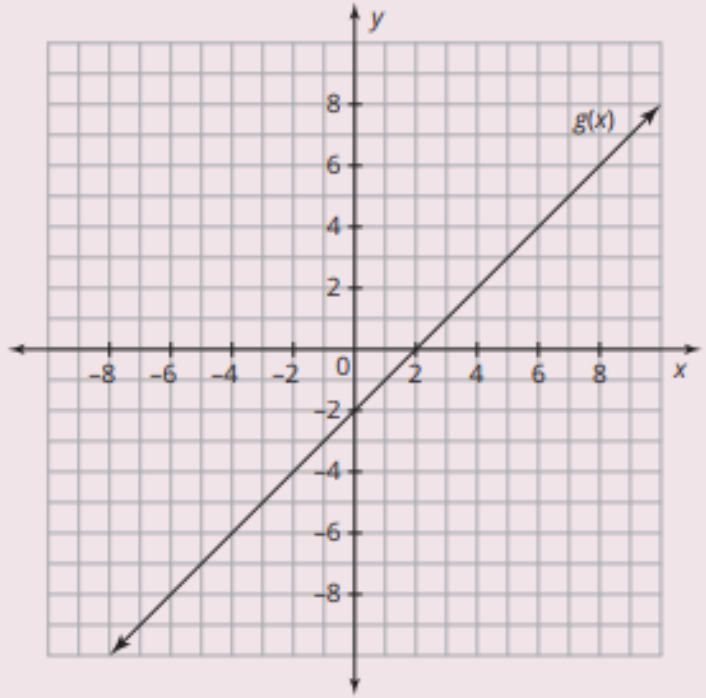
Function of lesser degree: _____

Consider two polynomial functions $f(x)$ and $g(x)$. Which polynomial has a greater number of real zeros? Justify your choice.

$f(x) = -2(x - 1)^3$	

1. Toby compared the table of values for $f(x)$ and the graph of $g(x)$ to determine which polynomial function has the greater number of real zeros.

x	$f(x)$
−2	3
−1	−2
0	−5
1	−6
2	−5
3	−2
4	3



2. Analyze each pair of representations. Then, answer each question and justify your reasoning.

a. Which function has a greater degree?

A polynomial function $h(x)$ has 1 absolute maximum and 1 relative maximum.	$j(x) = -40(x - 7)^2 + 30x^2 - 17x + 1$

b. Which function has a greater degree?

x	$m(x)$
−2	9
−1	3
0	1
1	3
2	9

A polynomial function $n(x)$ has a real zero and imaginary zeros.

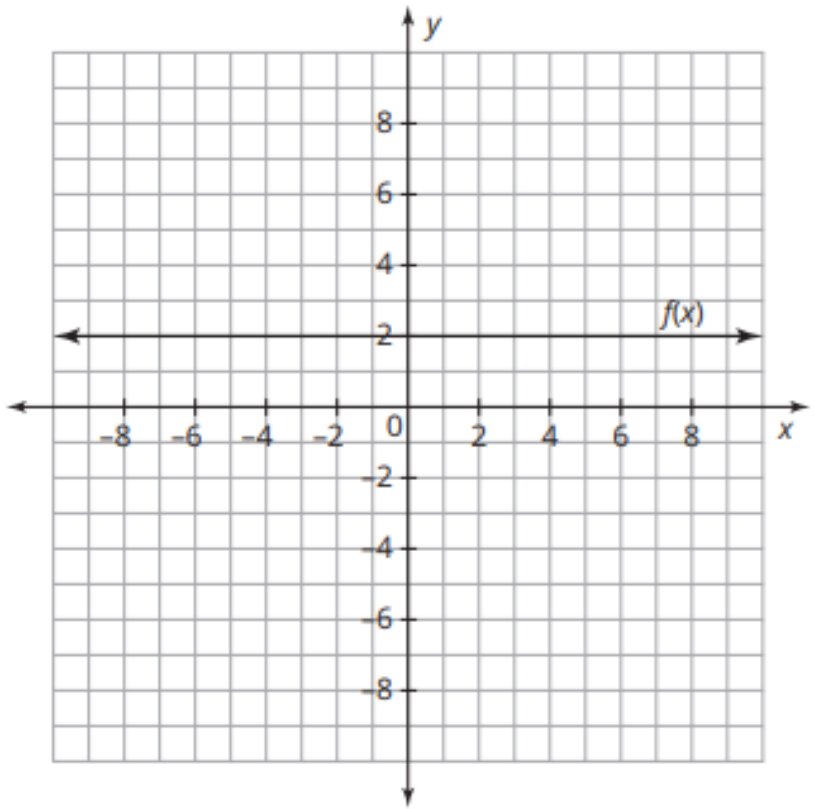
d. Determine which function has the greater output as *x* approaches infinity.

An odd function $r(x)$ with $a < 0$.	$k(x) = x^6 + x^4 + 3x^2 + 5x - 10{,}000$

e. Determine which function has the greater output as *x* approaches negative infinity.

$t(x) = -3(x - 4)^8 + 130$	A quartic function $s(x)$ with y-intercept (0, 5) and all imaginary roots.

Consider the representations shown. Which function has a greater y-intercept? Justify your reasoning.



A function $g(x)$ has an a-value less than zero and all roots have multiplicity 2.

b. Which function has a greater average rate of change for the interval (−1, 1)?

x	$j(x)$
−2	4
−1	1
0	0
1	1
2	4