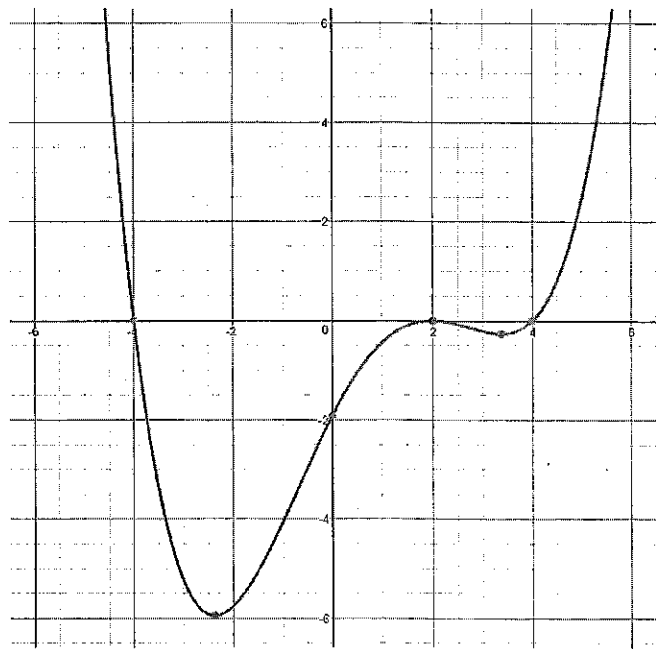


C Level Questions

1. Give 3 reasons why the function shown could NOT be represented by the polynomial $f(x) = -(x+4)^2(3x-2)(x-4)$. Be specific.



1. Leading coefficient is negative. Graph has a positive orientation.

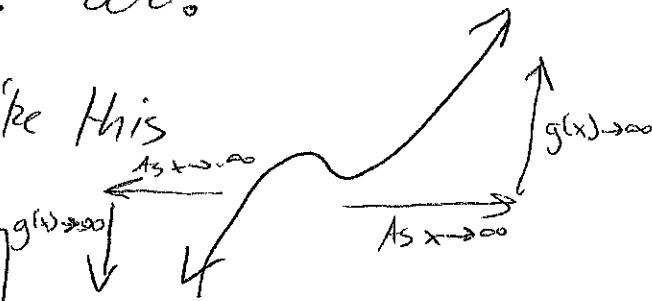
2. $x = -4$ has multiplicity of 2, so the graph should bounce at -4 . Instead, it bounces at $x = 2$.

3. If $(3x-2)$ is a factor, then $x = 2/3$ is a root. The graph has a root of 2, not at $2/3$.

2. Use the degree and leading coefficient of the polynomial to describe (without graphing) what happens to $g(x) = 3(x-1)(x-2)(x-3)^3$ when $x \rightarrow -\infty$ and when $x \rightarrow \infty$.

The leading coefficient is 3, which is positive.
The degree is 5, which is odd.

Positive, odd graphs look like this



As $x \rightarrow \infty, g(x) \rightarrow \infty$
As $x \rightarrow -\infty, g(x) \rightarrow -\infty$

A/B Level Questions

3. Jake takes a job as a financial analyst. He has been following a tech company that his firm is considering buying. The profits for the tech company over the last three years can be modeled with the polynomial $p(x) = (x^2 - 64)(x^2 - 10x + 16)$, where x = months since January 2013 and y = monthly profit in \$1000.

a. What is the constant for the polynomial and what does it tell you about the tech company?

Constant: $-64 \cdot 16 = -1024$. This means the company had a profit of -1024000 in January 2013.

b. Find all months in which the company earned zero profit. They lost a lot of \$.

$$(x^2 - 64)(x^2 - 10x + 16)$$

$$(x+8)(x-8)(x-8)(x-2)$$

$$x = -8, x = 8, x = 2$$

May 2012, Sep 2013, March 2013

4. Given that $h(3) = 0$ and $h(4) = 0$, for the polynomial $h(x) = x^4 - 15x^3 + 48x^2 + 44x - 240$, factor $h(x)$ and find all the roots of the polynomial.

If $h(3) = 0$, then $x - 3$ is a factor.

	x^3	$-12x^2$	$+12x$	$+80$	
\times	x^4	$-12x^3$	$12x^2$	$80x$	$\rightarrow x^3 - 12x^2 + 12x + 80$
-3	$-3x^3$	$36x^2$	$-36x$	-240	

If $h(4) = 0$, then $x - 4$ is a factor.

	x^2	$-8x$	-20	
\times	x^3	$-8x^2$	$-20x$	$\rightarrow x^2 - 8x - 20$
-4	$-4x^2$	$32x$	80	

	x	-10	
\times	x^2	$-10x$	
$+$			
2	$2x$	-20	

$$h(x) = (x-3)(x-4)(x-10)(x+2)$$

Roots = 3, 4, 10, -2