

C Level Questions

1. Simplify each polynomial expression. Write the solution in Standard Form:

a. $(4x^3 - 10x^2 + 2x - 7) + (3 - 2x - 5x^2 - 7x^3)$

$-3x^3 - 15x^2 - 4$

b. $(4x^3 - 10x^2 + 2x - 7) - (3 - 2x - 5x^2 - 7x^3)$

$11x^3 - 5x^2 + 4x - 10$

c. $(2x - 7)(3x^2 - 5x + 1)$

	$3x^2$	$-5x$	$+1$
$2x$	$6x^3$	$-10x^2$	$2x$
-7	$-14x^2$	$-35x$	-7

$= 6x^3 - 31x^2 + 37x - 7$

d. $\frac{6x^3 - 29x^2 + 32x - 14}{2x - 7}$

	$3x^2$	$-4x$	$+2$
$2x$	$6x^3$	$-8x^2$	$4x$
-7	$-14x^2$	$28x$	-14

$= 3x^2 - 4x + 2$

2. Simplify each rational expression fully.

a. $\frac{4x}{x+1} + \frac{4}{x+1}$

$\frac{4x+4}{x+1} = \frac{4(x+1)}{x+1} = 4$

b. $\frac{x^2}{x-1} - \frac{1}{x-1}$

$\frac{x^2 - 1}{x-1} = \frac{(x+1)(x-1)}{x-1} = x+1$

c. $\frac{2}{2x-2} \cdot \frac{x-1}{x+3}$

$\frac{2}{2(x-1)} \cdot \frac{x-1}{x+3} = \frac{1}{x+3}$

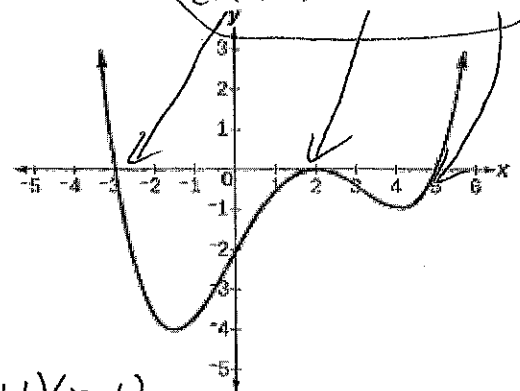
3. Write a polynomial function in Factored Form for each description below:

a. x-intercepts at (3,0), (4,0), (5,0) and a degree of 5.

$(x-3)(x-4)(x-5)$

b.

$(x+3)(x-2)^2(x-5)$



4. a. Factor $t(x) = (x^2 + 2x + 1)(x^2 - 1) = (x+1)(x+1)(x+1)(x-1)$

$(x+1)^3(x-1)$

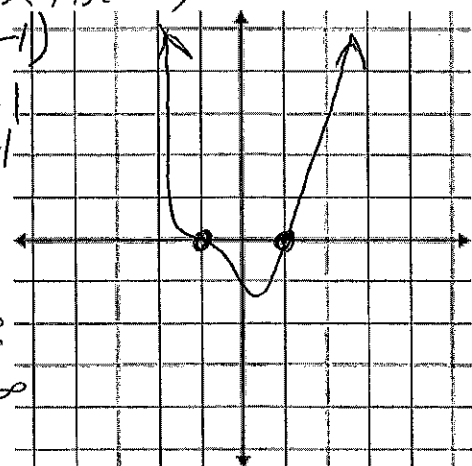
b. Identify the x-intercepts and state the multiplicity of each root.

$x = -1, x = 1$
Mult = 3, Mult = 1

c. Use the x-intercepts and multiplicities to sketch the graph of $t(x)$.

d. Describe what happens to $t(x)$ when $x \rightarrow \infty$ and when $x \rightarrow -\infty$.

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



A/B Level Questions

5. The polynomial $m(x) = a(x-b)^2(x-c)$ has a leading coefficient of 10, a constant of 120 and the root with multiplicity one is 3. Find a, b, and c.

$c=3$

$a=10$

So $m(x) = 10(x-b)^2(x-3)$. (constant of 120

means that $10 \cdot (-b)^2 \cdot (-3) = 120 \rightarrow b^2 = 4$
 $b = 2 \text{ or } -2$

6. Consider the function $p(x) = -2x^6$. Explain why $p(x) < 0$ when $x \rightarrow \infty$ and $p(x) < 0$ when $x \rightarrow -\infty$.

Because any # raised to an even power is positive, x^6 is positive. But a positive times a negative is negative, so $-2x^6$ is negative.
 AKA, $-2x^6 < 0$.

7. a. Show that $(x+1)^2 = x^2 + 2x + 1$

$$\begin{array}{r} x+1 \\ \times \\ \hline x^2 + 1x \\ 1x + 1 \\ \hline x^2 + 2x + 1 \end{array}$$

b. Show that $(2x+2)^2 = 4x^2 + 8x + 4$

$$\begin{array}{r} 2x+2 \\ \times \\ \hline 4x^2 + 4x \\ 4x + 4 \\ \hline 4x^2 + 8x + 4 \end{array}$$

c. Hence, what does $(3x+3)^2 = ?$

$$= 9x^2 + 18x + 9$$

d. Hence, what does $\frac{a^2x^2 + 2a^2x + a^2}{ax+a} = ?$ $ax+a$

8. Solve the equation $\frac{2}{x+1} - \frac{1}{x-1} = 0$ for x. Check your solution(s).

$$\frac{(x-1) \cdot 2}{(x-1)(x+1)} - \frac{1 \cdot (x+1)}{(x-1)(x+1)} = 0$$

$$\frac{2x-2}{(x-1)(x+1)} - \frac{x+1}{(x-1)(x+1)} = 0$$

$$\frac{x-3}{(x-1)(x+1)} = 0 \rightarrow x-3=0 \rightarrow x=3$$

Check:
 $\frac{2}{3+1} - \frac{1}{3-1} \stackrel{?}{=} 0$
 $\frac{2}{4} - \frac{1}{2} = 0$
 \Downarrow