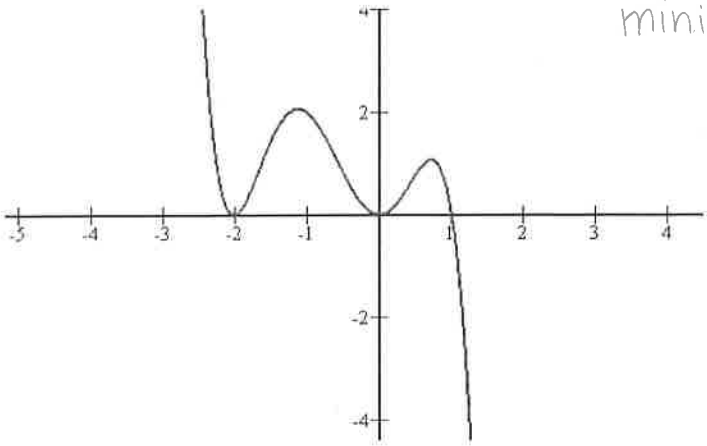
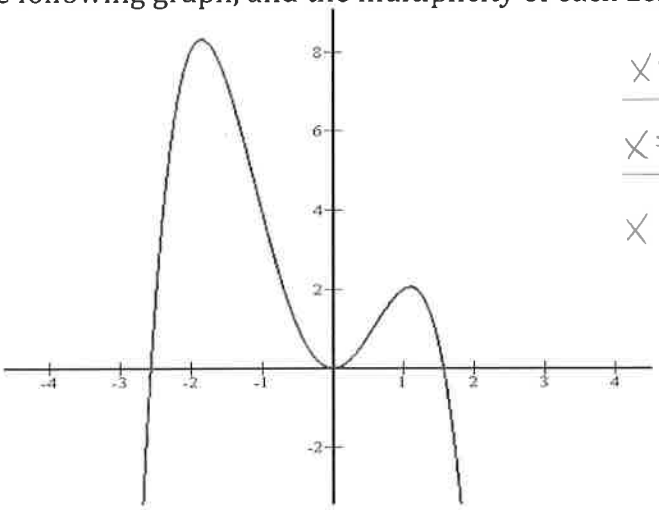
FMPC 12 Ch. 3- Polynomials Pre Test

1. What is the minimum degree of the following polynomial?

minimum degree is 5

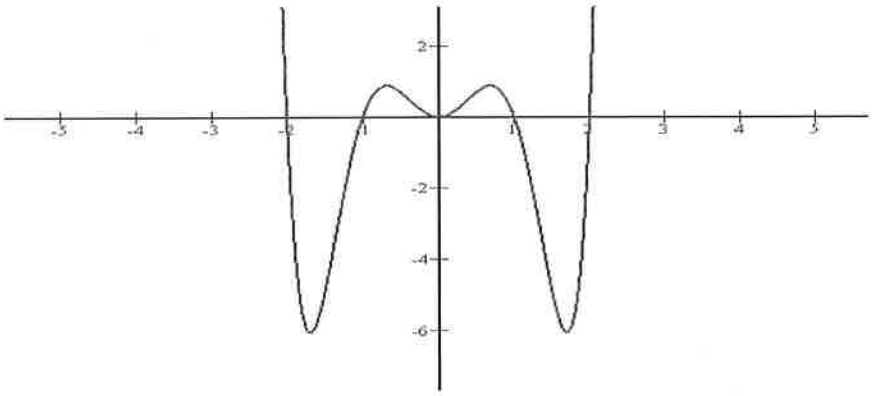


2. Estimate the zeros of the following graph, and the multiplicity of each zero:



	multiplicity
$x = -2.6$	1
$x = 0$	2
$x = 1.6$	1

3. Write the equation of the following graph:



$f(x) = a(x+2)(x+1)x^2(x-1)(x-2)$

4. If (x-3) is a factor of $f(x)$ what is the remainder of $f(3)$?

$$f(3) = 0$$

5. Divide the following $v^3 - 2v^2 - 14v - 5 \div v + 3$ using long division.

$$
\begin{array}{r|l}
 & v^2 - 5v + 1 \\
\hline
v+3 & v^3 - 2v^2 - 14v - 5 \\
 & \underline{v^3 + 3v^2} \\
 & -5v^2 - 14v \\
 & \underline{-5v^2 - 15v} \\
 & v - 5 \\
 & \underline{v + 3} \\
 & -8
\end{array}
$$

$$v^3 - 2v^2 - 14v - 5$$
$$= (v+3)(v^2 - 5v + 1) - 8$$

6. Use synthetic division on the following: $\dfrac{n^3 + 7n^2 + 14n + 3}{n+2}$

$$
\begin{array}{r|rrrr}
-2 & 1 & 7 & 14 & 3 \\
 & \downarrow & -2 & -10 & -8 \\
\hline
 & 1 & 5 & 4 & \boxed{-5}
\end{array}
$$

$$n^3 + 7n^2 + 14n + 3 = (n^2 + 5n + 4)(n+2) - 5$$

7. What is the remainder when $x^3 - 4x^2 + 5x - 3$ is divided by $x + 2$

$$f(-2) = (-2)^3 - 4(-2)^2 + 5(-2) - 3$$
$$= -8 - 4(4) - 10 - 3 = -8 - 16 - 13 = -37$$

8. Divide the following $\dfrac{n^3 - 12n + 3}{n - 3}$

$$
\begin{array}{r|rrrr}
3 & 1 & 0 & -12 & 3 \\
 & \downarrow & 3 & 9 & -9 \\
\hline
 & 1 & 3 & -3 & \boxed{-6}
\end{array}
$$

$$
\begin{array}{r|l}
 & n^2 + 3n - 3 \\
\hline
n-3 & n^3 + 0n^2 - 12n + 3 \\
 & \underline{n^3 - 3n^2} \\
 & 3n^2 - 12n \\
 & \underline{3n^2 - 9n} \\
 & -3n + 3 \\
 & \underline{-3n + 9} \\
 & -6
\end{array}
$$

=

9. What value of g will make x+3 a factor of $x^3 + 5x^2 + gx + 3$

$f(-3) = 0 \quad \therefore \quad (-3)^3 + 5(-3)^2 + g(-3) + 3 = 0$

$-27 + 45 - 3g + 3 = 0$

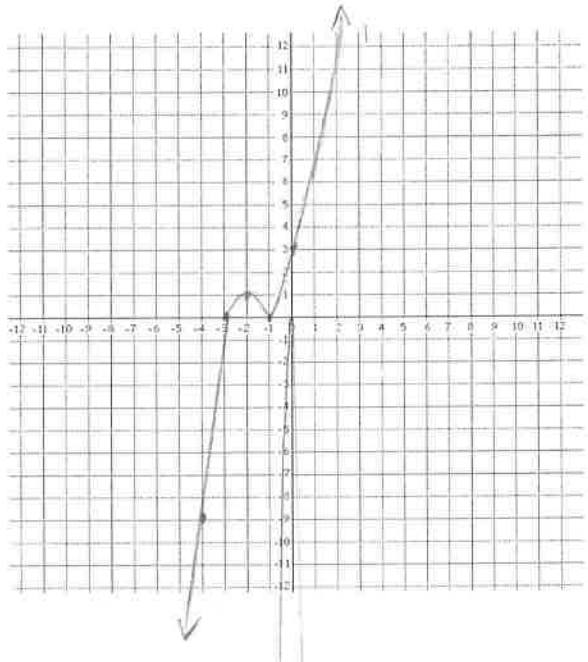
$21 - 3g = 0$

$g = 7$

10. Factor and sketch a graph of the following: $x^3 + 5x^2 + 7x + \underline{3}$ ← factors are +3, +1

Check if (x+1) is a factor

(+ve cubic)



-1	1	5	7	3
		-1	-4	-3
	1	4	3	0

$x^3 + 5x^2 + 7x + 3 = (x+1)(x^2 + 4x + 3)$

$= (x+1)(x+3)(x+1)$

* $f(-2) = (-2)^3 + 5(-2)^2 + 7(-2) + 3$

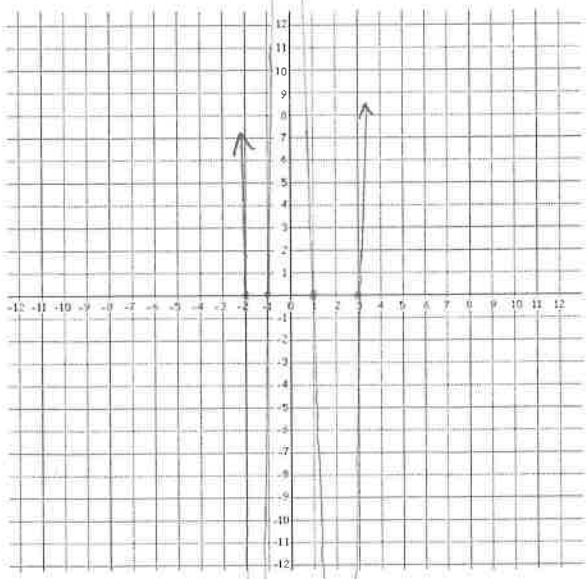
$= -8 + 20 - 14 + 3$

$= +1$

* $f(0) = 3$

* $f(-4) = (-4)^3 + 5(-4)^2 + 7(-4) + 3 = -64 + 80 - 28 + 3 = -9$

11. If a polynomial function has zeros -2,3,1,and -1 and a y-intercept of 36, write the equation of the function, and sketch a graph of it.



$f(x) = a(x+2)(x-3)(x-1)(x+1)$

$f(0) = 36$

$\therefore \quad 36 = a(0+2)(0-3)(0-1)(0+1)$

$36 = a(2)(-3)(-1)(1)$

$36 = 6a \longrightarrow a = 6$

$\therefore \quad f(x) = 6(x+2)(x-3)(x-1)(x+1)$

$f(-1.5) = 6(-1.5+2)(-1.5-3)(-1.5-1)(-1.5+1)$

$= 6(.5)(-4.5)(-2.5)(-.5) = -16.875$

$f(2) = 6(4)(-1)(1)(3)$

$= -72$

12. Factor completely $x^4 + 3x^3 - 13x^2 - 27x + 36$

use factor thm. to see if $x-1$ is a factor $\longrightarrow$ $f(1) = 1+3-13-27+36 = 0$ $\therefore$ $\boxed{x-1 \text{ is a factor}}$

use synthetic division...

$$\begin{array}{r|rrrrr} 1 & 1 & 3 & -13 & -27 & 36 \\ & \downarrow & 1 & 4 & -9 & -36 \\ \hline & 1 & 4 & -9 & -36 & \boxed{0} \end{array}$$

$= (x-1)(x^3+4x^2-9x-36)$

use factor thm. to see if $x-2$ is a factor of $x^3+4x^2-9x-36$ $\longrightarrow$ $f(2) = 2^3+4(2)^2-9(2)-36$

$= 8+16-18-36 = -30$ NO

is $x+2$ a factor $\longrightarrow$ $f(-2) = (-2)^3+4(-2)^2-9(-2)-36$

$= -8+16+18-36 = -10$ NO

is $x+3$ a factor $\longrightarrow$ $f(-3) = (-3)^3+4(-3)^2-9(-3)-36 = 0$ $\boxed{x+3 \text{ is a factor}}$

$$\begin{array}{r|rrrr} -3 & 1 & 4 & -9 & -36 \\ & \downarrow & -3 & -3 & 36 \\ \hline & 1 & 1 & -12 & \boxed{0} \end{array}$$

$= (x-1)(x+3)(x^2+x-12)$

$= (x-1)(x+3)(x+4)(x-3)$

13. Determine all of the real zeros of the following polynomial function

$$f(x) = x(x-3)(x^2+25)$$

$x = 0$

$x = 3$

$x^2+25 = 0$

$x^2 = -25$ $\therefore$ NO SOLUTION

14. Define, in your own words, what a polynomial function is.

15. What is the maximum number of x-intercepts, what is the minimum number of x-intercepts and determine the end behaviour of the following $y = 2 - 3x^3 + 5x - 6x^5$.

max = 5

min = 1

end behaviour.... start up high on left

ends low on right