MODULE 7

Polynomial Equations

1. Use the Fundamental Theorem of Algebra to state the number of zeros for each polynomial. Explain your response

   a. $f(x) = 2x^3 - 5x^2 - 3x$

Degree of polynomial is the equal to the # of zeros

3 zeros Since the degree is 3.

   b. $f(x) = -12x^5 - 15x^4 + 21x^3$

2. Use the Rational Root Theorem to **list** all *possible* zeros of the function.

   a. $f(x) = 8 - 6x + x^2 - x^3$

$\pm 1, \pm 2, \pm 4 \pm 8$

   b. $g(x) = -x^4 + 8x^3 - 6x^2 + x - 2$

3. Find the zeros of g(x) and then sketch its graph.

$g(x) = x^3 - 9x^2 + 23x - 15$

a. List possible zeros.

$\pm 1, \pm 3, \pm 5, \pm 15$

b. Find an actual zero of the polynomial.

1	1	-9	23	-15
	↓	1	-8	15
	1	-8	15	0

$x = 1$

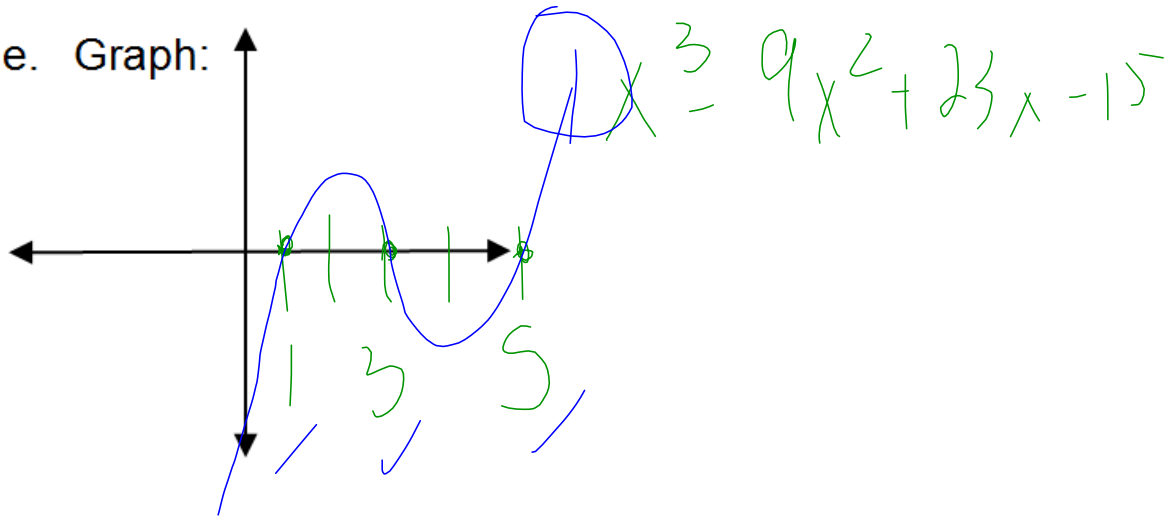
c. Find the other zeros of the polynomial

$f(x) = (x-1)(x^2 - 8x + 15)$

$f(x) = (x-1)(x-3)(x-5)$

d. List all the zeros: $x = 1 \quad x = 3 \quad x = 5$

e. Graph:



4. Are each of the following zeros of the function

$f(x) = 3x^3 + 17x^2 - 54x + 16$?

A	–8	O Yes	O No
B	0	O Yes	O No
C	$\frac{1}{3}$	O Yes	O No
D	2	O Yes	O No

$\frac{1}{3} \cdot \frac{3}{1}$

$\frac{1}{3}\ 18 = \frac{18}{3}$

$\frac{1}{3}(-48) = \frac{-48}{3}$

$-3 \mid 3\ \ 17\ \ -54\ \ 16$ → $3\ \ -24\ \ 6\ \ 18$ → $3\ \ 7\ \ 2\ \ 34$

$\frac{1}{3} \mid 3\ \ 17\ \ -54\ \ 16$ → $3\ \ 18\ \ -48$

5. Find the zeros of f(x)

$g(x) = x^3 - 6x^2 + 15x - 28$

a. List possible zeros

$\pm 1, \pm 4, \pm 2, \pm 7, \pm 14, \pm 28$

b. Find an actual zero of the polynomial.

$1 \mid 1\ \ -6\ \ 15\ \ -28$ → $1\ \ -5\ \ 10\ \ -18$

$4 \mid 1\ \ -6\ \ 15\ \ -28$ → $1\ \ -2\ \ 7\ \ 0$

$x = 4$

c. Find the other zeros of the polynomial

$f(x) = (x-4)(x^2 - 2x + 7)$

not factorable

use quadratic

d. List all the zeros:

$x = 4,\ x = 1 + \sqrt{6}i$

$x = 1 - \sqrt{6}i$

$x^2 - 2x + 7$ $b = -2$

$x = \frac{+2 \pm \sqrt{(-2)^2 - 4(1)(7)}}{2(1)}$ $4 - 28$

$\frac{2}{2} \pm \frac{\sqrt{-24}}{2}$ $\sqrt{24}$ $4 \cdot 6$

$1 \pm \frac{2\sqrt{6}i}{2} =$

$x = 1 \pm \sqrt{6}i$

6. Factor the polynomials

a. $f(x) = x^2 + 2x - 3$

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

b. $f(x) = 2x^2 - x - 3$

$(2x-3)(x+1)$

7. Write a polynomial function of least degree and leading coefficient 1 that has the given roots.

2, 3, and -1

Factored form: $(x-2)(x-3)(x+1)$

$x=2$

$x=3$

$x=-1$

$x^2-2x-3x+6$

$(x^2-5x+6)(x+1)$

Standard form: x^3-4x^2+x+6

$x^3+x^2-5x^2-5x+6x+6$

8. Which is the correct factored form for the polynomial with zeros x=-4 and x=2i?

~~A f(x)=(x-4)(x+2i)~~

~~B f(x)=(x-4)(x+2i)(x-2i)~~

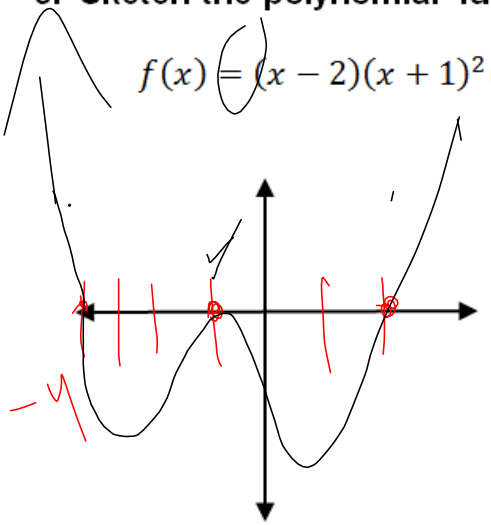
C f(x)=(x+4)(x+2i)(x-2i)

D f(x)=(x+4)(x-2i)

$x=-2i$

9. Sketch the polynomial function.

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



$x = 2$

$x = -1$ $x = -1$

$x = -4$

Degree: 4