UNIT 2 QUIZ REVIEW

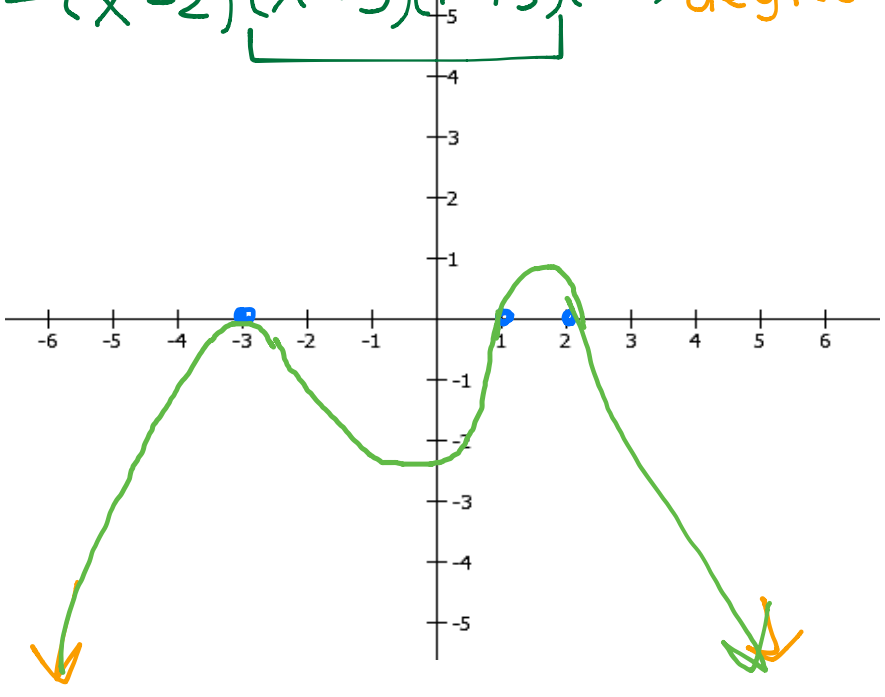
Polynomials

Use the zeros and end behavior of the polynomial to sketch a graph of each function.

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

$-(x-2)(x+3)(x+3)(x-1)$ degree: 4 L.C.: −

zeros:
- $x=2$ (cross)
- $x=-3$ (touch)
- $x=1$ (cross)



Find all the possible rational zeros

$$f(x) = 5x^4 - 11x^2 + 6$$

q: 5 p: 6

$\frac{p}{q}$: $\frac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 5}$

possible rational zeros: $\pm 1, \pm \frac{1}{5}, \pm 2, \pm \frac{2}{5}, \pm 3, \pm \frac{3}{5}, \pm 6, \pm \frac{6}{5}$

Find all complex zeros (real and imaginary if they exist) of each polynomial.

$$f(x) = x^5 - 2x^4 - x^3 + 8x^2 - 10x + 4$$

$\frac{p}{q}$: $\frac{\pm 1, \pm 2, \pm 4}{\pm 1}$

1 | 1 -2 -1 8 -10 4
↓ 1 -1 -2 6 -4
→ 1 -1 -2 6 -4 | 0

$x = \frac{2 \pm \sqrt{4 - 4(1)(2)}}{2}$

$x = \frac{2 \pm \sqrt{-4}}{2}$

$x = \frac{2 \pm 2i}{2} = 1 \pm i$

-2 | 1 -1 -2 6 -4
↓ -2 6 -8 4
1 -3 4 -2 | 0

zeros:
$x = 1, x = -2, x = 1, x = 1 \pm i$

1 | 1 -3 4 -2
↓ 1 -2 2
→ 1 -2 2 | 0

$x^2 - 2x + 2$

Find all complex zeros (real and imaginary if they exist) of each polynomial.

$$f(x) = x^3 - 3x^2 - 10x + 24$$

$\frac{p}{q}$: $\frac{\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24}{\pm 1}$

2 | 1 -3 -10 24
↓ 2 -2 -24
1 -1 -12 0

$x^2 - x - 12 = 0$

$(x-4)(x+3) = 0$

$x = 4 \quad x = -3$

zeros: $x = 2, x = 4, x = -3$

Rewrite the polynomial in factored form

$$f(x) = x^4 - 4x^3 + 3x^2 + 2x - 6$$

$\frac{p}{q}$: $\frac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1}$

-1

	1	−4	3	2	−6
↓		−1	5	−8	6
	1	−5	8	−6	0

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

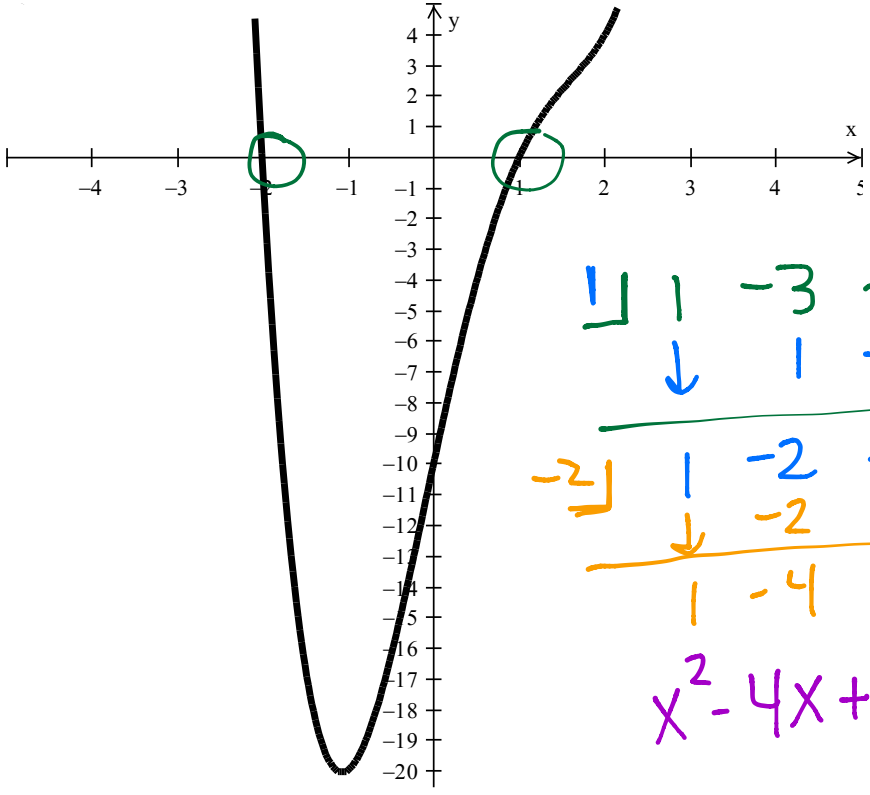
3

	1	−5	8	−6
↓		3	−6	6
	1	−2	2	0

$x^2 - 2x + 2$

Use the graph to find the zeros of *f(x)*. Show work

$$f(x) = x^4 - 3x^3 - x^2 + 13x - 10$$



$$x = \frac{4 \pm \sqrt{16 - 4(11)(5)}}{2}$$

$$x = \frac{4 \pm \sqrt{-4}}{2}$$

$$x = \frac{4 \pm 2i}{2}$$

$$x = 2 \pm i$$

1	1	−3	−1	13	−10
	↓	1	−2	3	10
	1	−2	−3	10	0
−2	1	−2	−3	10	0
	↓	−2	8	−10	
	1	−4	5	0	

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

Zeros: $x = 1, x = -2$
$x = 2 \pm i$

Write a polynomial in **standard form**

degree: 4; zeros: -2, 3/2, -1 multiplicity 2;

leading coefficient: 2

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

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

$= 2x^4+4x^3+2x^2+x^3+2x^2+x-6x^2-12x-6$

$= \boxed{2x^4+5x^3-2x^2-11x-6}$

Write a polynomial in **standard form**

degree: 3; zeros: -3, -1+i, -1-i

leading coefficient of 1

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

$= (x+3)(x^2+x-ix+x+1-i+ix+i-i^2)$

$= (x+3)(x^2+2x+2)$

$= (x^3+2x^2+2x+3x^2+6x+6)$

$= \boxed{x^3+5x^2+8x+6}$

Use the given zero to find all remaining zeros.

$$f(x) = 5x^4 + 9x^4 + 3x^3 - 11x^2 - 8x + 2$$

Given $-1 + i$, $-1-i$

$(x+1+i)(x+1-i) = x^2+2x+2$

$$
\begin{array}{r}
5x^3 - x^2 - 5x + 1 \\
x^2+2x+2 \overline{)\,5x^5 + 9x^4 + 3x^3 - 11x^2 - 8x + 2} \\
-\,(5x^5 + 10x^4 + 10x^3) \\
\hline
0 \quad -x^4 - 7x^3 - 11x^2 \\
-\,(x^4 + 2x^3 + 2x^2) \\
\hline
-5x^3 - 9x^2 - 8x \\
-\,(5x^3 + 10x^2 + 10x) \\
\hline
\end{array}
$$

$x^2 + 2x + 2$

$5x^3 - x^2 - 5x + 1$

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

$(5x-1)(x^2-1) = 0$

$x = \frac{1}{5} \quad x = 1 \quad x = -1$