

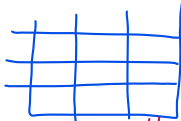
Name: _____

Unit 4 Quiz Review Polynomial & Rational Functions

Given the information provided, create a polynomial function in **STANDARD FORM**.

1. Zeros: 3 (multiplicity 2) Degree: 4
 -1 (multiplicity 2)

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

3x3 

Function: $f(x) = x^4 - 4x^3 - 2x^2 + 12x + 9$

(Note: Two synthetic division tables are shown for x-3 and x+1, each with a 3x3 grid below it.)

2. Zeros: 3, -1, 2i, -2i Degree: 4

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

3x2

Function: $f(x) = x^4 - 2x^3 + x^2 - 8x - 12$

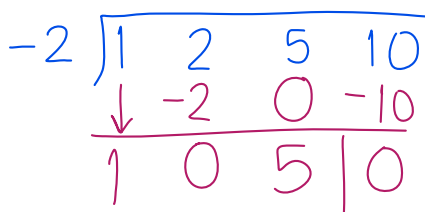
$\star i^2 = -1$
 $i = \sqrt{-1}$

Finding zeros of f(x).

3. Given $x = -2$ is a solution of $f(x) = x^3 + 2x^2 + 5x + 10$, find all solutions.
 (zero)

$$f(x) = (x+2)(x^2+5)$$

$x = -2, \pm i\sqrt{5}$



4. $f(x) = x^3 - 9x^2 + 25x - 25$. Find all zeros, provided that one zero is 5.

synthetic div $f(x) = (x-5)(x^2 - 4x + 5)$

Quadratic Formula

$x = 5, 2 \pm i$

not factorable QF!

5. $f(x) = x^3 - 10x^2 + 29x - 26$. Find all zeros given that $(x-2)$ is a factor. *not factorable Q.F!*

$$x = 2, 4 \pm \sqrt{3} \quad f(x) = (x-2)(x^2 - 8x + 13)$$

6. Find ALL zeros of $f(x)$.

$$f(x) = -2(x+7)^3(x^2-2)(x^2+4)$$

$$x^2 + 4 = 0$$

$$\sqrt{x^2} = \pm \sqrt{4}$$

$$x = \pm 2i$$

All Zeros: $-7, \pm\sqrt{2}, \pm 2i$

7. Use the Decartes' Rule of Signs to determine the following.

$$f(x) = x^4 - x^3 + 3x^2 + 4x - 15$$

$$f(-x) = x^4 + x^3 + 3x^2 - 4x - 15$$

of Possible Positive Zeros: 3 OR 1

Negative: 1

8. List the possible rational zeros of the polynomial function.

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

Possible Rational Zeros: $\frac{p}{q} = \pm 1, \pm 2, \pm 5, \pm 10, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{5}{3}, \pm \frac{10}{3}$

9. Find ALL zeros of the polynomial function.

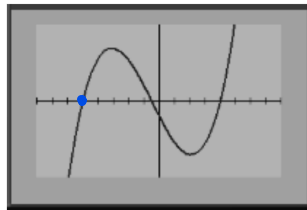
$$f(x) = 2x^3 + 3x^2 - 39x - 20$$

$$f(x) = (x+5)(2x^2 - 7x - 4)$$

$$\begin{array}{r} -5 \overline{) 2 \ 3 \ -39 \ -20} \\ \underline{\downarrow -10 \ 35 \ 20} \\ 2 \ -7 \ -4 \ 0 \end{array}$$

$$(2x+1)(x-4)$$

$$x = -5, -\frac{1}{2}, 4$$



$$2x^2 - 8x + x - 4$$

10.	Function	Vertical Asymptote	Horizontal Asymptote	Slant Asymptote	Hole
A	$f(x) = \frac{2x-1}{3x}$	$x=0$	$y=\frac{2}{3}$	Yes or No ()	(/)
B	$f(x) = \frac{5x}{x^2-4}$	$x=\pm 2$	$y=0$	Yes or No ()	(/)
C	$f(x) = \frac{x^4+x^3-2}{(x-3)(x+1)}$	$x=3, -1$	none	Yes or No ()	(/)
D	$f(x) = \frac{x}{x^2-1}$	$x=\pm 1$	$y=0$	Yes or No ()	(/)
E	$f(x) = \frac{x^2+4}{x-5}$	$x=5$	none	Yes or No ()	(/)
F	$f(x) = \frac{2(x-1)(x+3)}{(x+6)(x+3)}$	$x=-6$	$y=2$	Yes or No ()	$(-3, -\frac{8}{3})$
G	$f(x) = \frac{(x+3)(x-2)}{(x-2)(x+4)}$	$x=-4$	$y=1$	Yes or No ()	$(2, \frac{5}{6})$
H	$f(x) = \frac{(x-5)(x+3)^2}{(x+1)(x+2)}$	$x=-1, -2$	none	Yes or No ()	(/)

Find the slant asymptote.

11. $f(x) = \frac{x^3 + 4x^2 - 6x + 5}{x^2 + 3}$

long division

$$y = x + 4$$

12. $f(x) = \frac{2x^2 + 5x - 12}{4x + 4}$

difficult
you may skip

$$y = \frac{1}{2}x + \frac{3}{4}$$

13. $f(x) = \frac{x^2 - 4}{x^2 + x - 2} = \frac{(x+2)(x-2)}{(x+2)(x-1)} = \frac{-2-2}{-2-1} = \frac{-4x+2=0}{-3 \quad -2 \quad -2}$
 $x = -2$
 hole: $(-2, \frac{4}{3})$

VA: $x = 1$	Domain: $\{x \mid x \neq 1, -2\}$	x-int $(2, 0)$	Graph
HA: $y = \frac{1}{1} = 1$	Range: $\{y \mid y \neq 1, \frac{4}{3}\}$	y-int $(0, 2)$	

14	$f(x) = \frac{3x}{x^2 - 25}$, VA is...	$x = 5$	$x = \pm 5$
15	$f(x) = \frac{x-3}{(x+4)(x-3)}$, VA is...	$x = -4$	$x = -4, 3$
16	$f(x) = \frac{8x+2}{2x^2-1}$, HA is...	$y = 0$	$y = 4$
17	$f(x) = \frac{x^2+2x-5}{3x^2+4}$, HA is...	$y = 1$	$y = \frac{1}{3}$
18	$f(x) = \frac{x^4+2x^3+x-3}{x^2-4}$	Slant Asymptote	No Slant Asymptote
19	$f(x) = \frac{x-3}{(x+4)(x-3)}$, Find the hole	$(3, 0)$	$(3, \frac{1}{7})$
20	Possible rational zeros: $f(x) = 2x^4 + x - 5$	$\pm\{1, 2, 5\}$	$\pm\{1, \frac{1}{2}, 5, \frac{5}{2}\}$