Quarter 2 Summative Review
Secondary Math III

Name: Key
Class:

Unit 4

State how many complex zeros the function has and identify as real and non-real.

1. $f(x)=x^2-2x+7$

C: 2 → R: 0, I: 2

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

C: 3 → R: 1, I: 2

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

C: 4 → R: 2, I: 2

4. $f(x)=x^5-2x^2-3x+6$

C: 5 → R: 1, I: 2

Write a polynomial in factored form given the following zeros.

5. x = 1, 3*i*, -3i

$\boxed{(x-1)(x-3i)(x+3i)}$

6. x = 3, -2 (mult of 2), 4*i*, -4i

$\boxed{(x-3)(x+2)^2(x-4i)(x+4i)}$

Use the given zero to find all the zeros of the function.

7. -4; $x^3+4x^2+25x+100$

-4	1	4	25	100
	↓	-4	0	-100
	1	0	25	0
	a	b	c	

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-0 \pm \sqrt{0-4(1)(25)}}{2(1)} = \frac{\pm\sqrt{0-100}}{2} = \frac{\pm\sqrt{-1}}{2}$

$= \frac{\pm 10i}{2} = \pm 5i$

zeros: $\boxed{x = -4, 5i, -5i}$

factors: $(x+4)(x-5i)(x+5i)$

use a calc.

8. 2; $x^4-x^3-x^2-x-2$

2	1	-1	-1	-1	-2
	↓	2	2	2	2
-1	$1x^3$ +	$1x^2$ +	$1x$ +	1	0
	↓	-1	0	-1	
	$1x^2$ +	$0x$ +	1	0	
	a	b	c		

$x = \frac{-0 \pm \sqrt{0-4(1)(1)}}{2(1)} = \frac{\pm\sqrt{-4}}{2} = \frac{\pm 2i}{2} = \pm i$

zeros: $\boxed{x = 2, -1, i, -i}$

factors: $(x-2)(x+1)(x-i)(x+i)$

9. $3i, f(x)=x^3+x^2+9x+9$

3i	1	1	9	9
	↓	3i	3i-9	-9
	1	1+3i	3i	0
	x^2	x		

-3i	$1x^2$	$(1+3i)x$	$(3i)$
	↓	-3i	-3i
	1	1	0

$x + 1 = 0$

zeros: $\boxed{x = 3i, -3i, -1}$

factors: $\boxed{(x-3i)(x+3i)(x+1)}$

Unit 5

Convert the radical to exponent form and vice versa:

10. $(\sqrt[3]{x})^4$

$\boxed{x^{4/3}}$

11. $x^{\frac{8}{3}}$

$\boxed{\sqrt[3]{x^8}}$

Powers in the sky!
Roots in the ground!

Solve the following equations, check for extraneous solutions:

12. $\sqrt{x-1}^{\,2} = 5^2$

$x - 1 = 25$
$+1 \quad +1$
$\boxed{x = 26}$

Check:
$\sqrt{26-1} = 5$
$\sqrt{25} = 5$
$5 = 5$ ✓

13. $(x-6)^2 = \sqrt{18-3x}^{\,2}$

$(x-6)(x-6) = 18 - 3x$
$x^2 - 12x + 36 = \cancel{18} - \cancel{3x}$
$+3x \quad -18 \quad -\cancel{18} \quad +\cancel{3x}$
$x^2 - 9x - 18 = 0$

$(x-6)(x-3) = 0$
$\boxed{x = 6}$ ✓ $\cancel{3}$

Check:
$6 - 6 = \sqrt{18 - 3(6)}$
$0 = \sqrt{18-18}$
$0 = \sqrt{0}$
$0 = 0$ ✓

$3 - 6 = \sqrt{18 - 3(3)}$
$-3 = \sqrt{18-9}$
$-3 = \sqrt{9}$
$-3 = 3$ ✗

14. $\left((x+4)^{\frac{1}{2}}\right)^2 = (6)^2$

$x + 4 = 36$
$-4 \quad -4$
$\boxed{x = 32}$

Check
$(32+4)^{1/2} = 6$
$(36)^{1/2} = 6$
$6 = 6$ ✓

15. $\left((x-6)^{\frac{1}{2}}\right)^2 = (x-2)^2$

$x - 6 = (x-2)(x-2)$
$x - 6 = x^2 - 4x + 4$
$-x + 6 \quad -x + 6$
$0 = x^2 - 5x + 10$

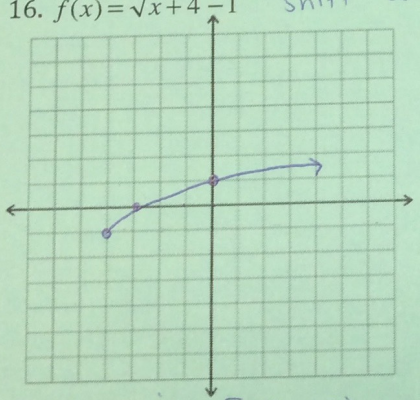
Not Factorable

No Solution

Graph the following and state the domain and range:

16. $f(x) = \sqrt{x+4} - 1$

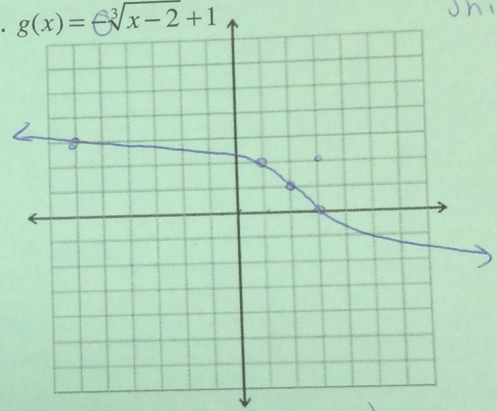
Shift Left 4
Shift Down 1



Domain: $[-4, \infty)$
Range: $[-1, \infty)$

17. $g(x) = -\sqrt[3]{x-2} + 1$

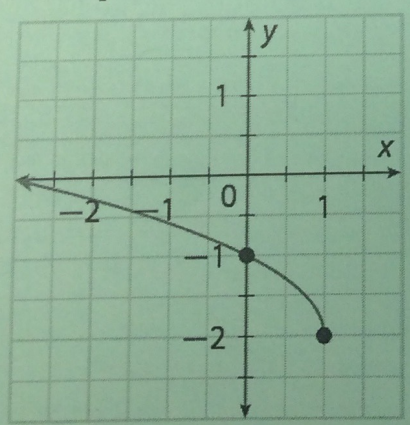
V. Flip
Shift Right 2
Shift Up 1



Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$

Write the equation for the following graphs:

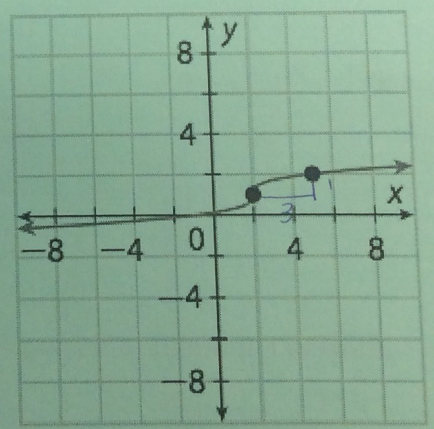
18.



Shifts: Down 2, Right 1
Flip: Horizontal

$\boxed{f(x) = \sqrt{-(x-1)} - 2}$

19.



careful w/ the scale!

Shifts: Right 2, Up 1
Stretch: H. Stretch by 3

$\boxed{f(x) = \sqrt[3]{\tfrac{1}{3}(x-2)} + 1}$

Unit 6

Perform the following operations. List excluded values.

20. Divide $\frac{x+2}{x-4} \div \frac{x}{3x-12}$ $x \neq 4, 0$

$\frac{x+2}{\cancel{(x-4)}} \cdot \frac{3\cancel{(x-4)}}{x} = \boxed{\frac{3(x+2)}{x}}$

21. Multiply $\frac{(x-5)(x+1)}{3x-15} \bullet \frac{4}{(x-3)(x+1)}$ $x \neq 5, 3, -1$

$\frac{\cancel{(x-5)}\cancel{(x+1)}}{3\cancel{(x-5)}} \cdot \frac{4}{(x-3)\cancel{(x+1)}} = \boxed{\frac{4}{3(x-3)}}$

22. Add. $\frac{1}{x^{x}3+x} + \frac{(3-x)}{x} \cdot \frac{(3+x)}{(3+x)}$

LCD: $(3+x)(x)$ $x \neq -3, 0$

$\frac{x}{x(3+x)} + \frac{(3-x)(3+x)}{x(3+x)} = \boxed{\frac{-x^2+x+9}{x(3+x)}}$

23. Subtract. $\frac{4}{(x+1)(x-1)} - \frac{(x+2)}{(x-1)} \frac{(x+1)}{(x+1)}$

LCD: $(x+1)(x-1)$ $x \neq -1, 1$

$\frac{4}{(x+1)(x-1)} - \frac{(x+2)(x+1)}{(x+1)(x-1)} = \boxed{\frac{-x^2-3x+2}{(x+1)(x-1)}}$

Solve the following rational equations. Be cautious of extraneous solutions.

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

LCD: $(x-1)(x-3)$

$x \neq 1, 3$

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

$2x^2 - 6x + x - 1 = 2$
$\quad -2 \quad -2$

$2x^2 - 5x - 3 = 0$

$-6 \cdot 1 = -6$
$-6 + 1 = -5$

$(2x^2 - 6x) + (x - 3) = 0$

$2x(x-3) + 1(x-3) = 0$

$(x-3)(2x+1) = 0$

$x = \cancel{3}, -1/2$ $\boxed{x = -1/2}$

25. ~~$f(x) = \sqrt[3]{x-5}$~~

26. It takes 1.5 hours for Tim to mow the lawn. Linda can mow the same lawn in 2 hours. How long will it take John and Linda, work together, to mow the lawn?

job
time

T + L = Together

$\frac{2(x)}{2x} \frac{1}{1.5} + \frac{1.5(x)1}{1.5x\,2} = \frac{1}{x} \cdot \frac{2(1.5)}{2 \cdot 1.5}$

LCD: $1.5(2)x$
$3x$

$2x + 1.5x = 3$

$\frac{3.5x}{3.5} = \frac{3}{3.5}$

$\boxed{x = 3/3.5 = 0.86 \text{ hrs}}$

Find the inverse of the following:

27. $\cancel{f(x)}\ y = \frac{2x-3}{x+1}$

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

$xy + 1x = 2y - 3$
$-2y \quad -2y$

$xy - 2y + x = -3$
$\quad -x \quad -x$

$xy - 2y = -x - 3$

~~$y(x-2y$~~

$\frac{y\cancel{(x-2)}}{\cancel{(x-2)}} = \frac{-x-3}{(x-2)}$

$\boxed{f^{-1}(x) = \frac{-x-3}{x-2}}$ OR

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

28. $f(x) = \sqrt[3]{x} - 5$

$x = \sqrt[3]{y} - 5$
$+5 \quad +5$

$(x+5)^3 = \sqrt[3]{y}^{\,3}$

$(x+5)^3 = y$

$\boxed{f^{-1}(x) = (x+5)^3}$