1-9-2019

Algebra 2 – Review for Chapter 4 Test

1. Find the domain and zeros of the following:

a) $f(x) = x^3 + 3x^2 - 70x$ Zeros $0, -10, 7$

$D = (-\infty, \infty)$

b) $f(x) = \sqrt{9 - x}$

Domain $9 - x \geq 0$ $(-\infty, 9]$ Zeros $x = 9$ $0 = \sqrt{9-x}$

$9 \geq x$ $9 - x = 0$

$x = 9$

c) $f(x) = \frac{4x-1}{5-x}$ $5 - x \neq 0$

$5 \neq x$

Domain $(-\infty, 5) \cup (5, \infty)$ Zeros $x = 1/4$ $4x - 1 = 0$

$\frac{4x}{4} = \frac{1}{4}$

d) $f(x) = \sqrt{x+7} - 12$

$x + 7 \geq 0$

Domain $x \geq -7$ $[-7, \infty)$ Zeros $x = 137$ $0 = \sqrt{x+7} - 12$

$12 = \sqrt{x+7}$

$144 = x + 7$

$137 = x$

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

Domain $(-\infty, \infty)$

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

$x = 1/2, -6$

2. Let $f(x) = x^2 + 2x$ and $g(x) = x + 2$ and $h(x) = \sqrt{x+3}$. Find the following:

a) $(f+g)(x)$ $x^2 + 3x + 2$

b) $(f-g)(x)$ $x^2 + x - 2$

c) $(fg)(x)$ $x^3 + 4x^2 + 4x$

d) $(f/g)(x)$ $\frac{x^2+2x}{x+2}$ $\frac{x(x+2)}{x+2} = x$

e) $(f \circ g)(x)$ $(x+2)^2 + 2(x+2)$

$x^2 + 6x + 8$

f) $(g \circ f)(x)$ $x^2 + 2x + 2$

g) $(h \circ g)(x)$ $\sqrt{(x+2)+3} = \sqrt{x+5}$

h) $(f \circ h)(x)$ $\left(\sqrt{x+3}\right)^2 + 2\sqrt{x+3} = x + 3 + 2\sqrt{x+3}$

i) $f(h(6))$ $= 3$

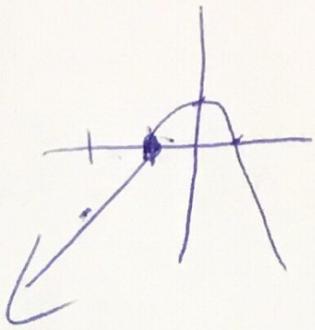
j) $h(g(f(1)))$ $2\sqrt{2}$

3. Graph the piecewise functions. Then find the domain, range, and zeros.

a) $f(x) = \begin{cases} x+1, & if\ x < -1 \\ 1-x^2, & if\ x \geq -1 \end{cases}$

| $x+1$ | |
|---|---|
| -1 | 0 |
| -2 | -1 |

| $1-x^2$ | |
|---|---|
| -1 | 0 |
| 0 | 1 |
| 1 | 0 |



Domain $(-\infty, \infty)$

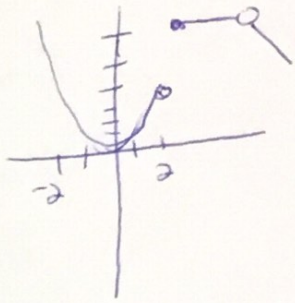
Range $(-\infty, 1]$

Zeros $-1, 1$

b) $G(x) = \begin{cases} x^2, & if\ x < 2 \\ 6, & if\ 2 \leq x < 4 \\ 10-x, & if\ 4 < x \leq 6 \end{cases}$

| $x^2$ | |
|---|---|
| 2 | 4 |
| 0 | 0 |
| -2 | 4 |

| $10-x$ | |
|---|---|
| 4 | |
| 6 | |



Domain $(-\infty, 4) \cup (4, 6]$

Range $[0, \infty)$ Zeros 0

4. Find the inverses of the following functions.

a) $F(x) = 3x - 7$

$y = 3x - 7$

$x = 3y - 7$

$\frac{x+7}{3} = \frac{3y}{3}$

$F^{-1}(x) = \frac{x+7}{3}$

b) $F(x) = \sqrt{x+5} - 6$

$y = \sqrt{x+5} - 6$

$x = \sqrt{y+5} - 6$

$(x+6)^2 = \left(\sqrt{y+5}\right)^2$

$(x+6)^2 = y+5$

$(x+6)^2 - 5 = f^{-1}(x)$

c) $F(x) = \frac{4+x}{6-2x}$

$(6-2y)\,x = \frac{4+y}{6-2y}(6-2y)$

$x(6-2y) = 4+y$

$6x - 2xy = 4+y$

$6x - 4 = y + 2xy$

5. Show that the functions f(x) and g(x) are inverses of each other.

$f(x) = 4x - 5$ $\quad$ $g(x) = \frac{x+5}{4}$

$f^{-1}(x) = \frac{6x-4}{1+2x} = y\frac{(1+2x)}{1+2x}$

$f(g(x)) = 4\left(\frac{x+5}{4}\right) - 5$

$x + 5 - 5$

$x$

$g(f(x)) = \frac{4x-5+5}{4}$

$x$

$=$