Jonathan Quang 10/24/16

1. $f(x) = \sqrt{x^2-5x-6}$

x^2-5x-6 must be ≥ 0

$(x-6)(x+1)$ must be ≥ 0

The graph of x^2-5x-6 is a prabola that opens upward

$dom(f(x)) = (-\infty, -6] \cup [1, \infty)$

2. $g(x) = \frac{2x-8}{3x+5}$

$r = \frac{2x+8}{3x+5} \Rightarrow 3xr+5r = 2x-8 \Rightarrow 3xr-2x = -5r-8 \Rightarrow x(3r-2) = -5r-8$

$\Downarrow$

$x = \frac{-5r-8}{3r-2}$

$x \neq \frac{2}{3}$

$ran(g(x)) = (-\infty, \frac{2}{3}) \cup (\frac{2}{3}, \infty)$

3. $f(x) = 2x^2-3x \quad g(x) = 2-x$

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

b) $(f \circ g)(x) = f(2-x) = 2(2-x)^2-3(2-x) = 2(4-4x+x^2)-6+3x =$
$8-8x+2x^2-6+3x = 2x^2-5x+8$

c) $f[g(-4)] = f[2-(-4)] = f[6] = 2(6)^2-3(6) = 72-18 = 54$

4. $f(t) = 2/t$

$\frac{f(t)-f(a)}{t-a} = \frac{\frac{2}{t}-\frac{2}{a}}{t-a} = \frac{\frac{2a-2t}{ta}}{t-a} = \frac{2a-2t}{(t-a)(ta)} = \frac{-2(t-a)}{(t-a)(ta)} = \frac{-2}{ta}$

5. $g(x) = 2x^2-5x$

$\frac{g(x+h)-g(x)}{h} = \frac{2(x+h)^2-5(x+h)-2x^2+5x}{h} = \frac{2(x^2+2xh+h^2)-5x-5h-2x^2+5x}{h}$

$= \frac{2x^2+4xh+2h^2-5x-5h-2x^2+5x}{h} = \frac{4xh+2h^2-5h}{h} = 4x+2h-5$ if $h \neq 0$

6. $g^{-1}(x)$ given $g(x)=\frac{-4x}{6x+1}$

let $y=g^{-1}(x)$

$x=\frac{-4y}{6y+1} \Rightarrow 6xy+x=-4y \Rightarrow 6xy+4y=-x \Rightarrow y(6x+4)=-x \Rightarrow$

$y=\frac{-x}{6x+4}$

$g^{-1}(x)=\frac{-x}{6x+4}$

7. $m=\frac{6-1}{5-(-3)}=\frac{5}{8}$

$y=mx+b$

$6=5m+b$

$6=5\left(\frac{5}{8}\right)+b$

$6=\frac{45}{8}+b$

$\frac{48-45}{8}=b$

$\frac{3}{8}=b$

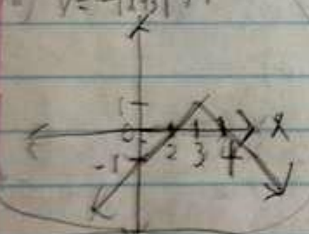
$y=mx+b$

$y=\frac{5}{8}x+\frac{3}{8}$

$x=\frac{5}{8}f^{-1}(x)+\frac{3}{8} \Rightarrow x-\frac{3}{8}=\frac{5}{8}f^{-1}(x) \Rightarrow \left(x-\frac{3}{8}\right)\frac{8}{5}=f^{-1}(x)$

$\frac{8}{5}$ is the slope of $f^{-1}(x)$

8. a) $y=-|x+3|+1$



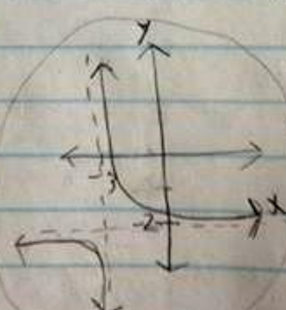
x-intercepts: {2, 4}

y-intercept: -2

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

vertical asymptote: -3

horizontal asymptote: 0-2=-2



$0=\frac{1}{x_{int}+3}-2$

$2=\frac{1}{x_{int}+3}$

$2x_{int}+6=1$

$x_{int}=-2.5$

$y_{int}=\frac{1}{0+3}-2$

$y_{int}=\frac{1}{3}-2$

$y_{int}=-1\frac{2}{3}$

x intercept: -2.5

y intercept: $-1\frac{2}{3}$

9) (a) $ran(g(x)) = [-3,1]$

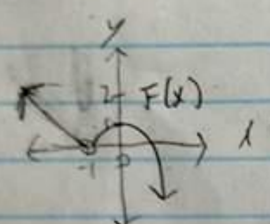
b) $(-3,1)$

c) -3

d) -2 yields the maximum for g at 1

e) $[-2,2]$

f) g is not one-to-one

11. 

$dom(F(x)) = (-\infty,1)\cup(1,\infty$

13. $m = \frac{-2 - -3}{5-1} = \frac{-5}{4}$

$y = \frac{-5}{4}x + b$

$3 = -\frac{5}{4} + b$

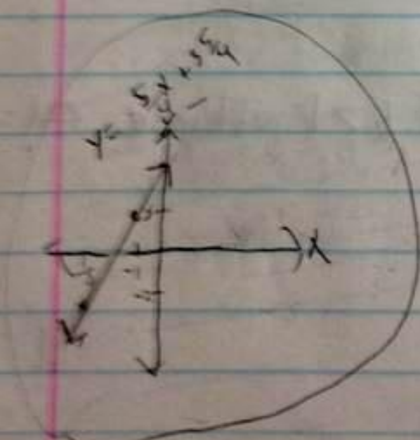
$3 + \frac{5}{4} = b$

$3\frac{5}{4} = b$

$y = \frac{-5}{4}x + 3\frac{5}{4}$

$f(x) = \frac{-5}{4}x + 3\frac{5}{4}$

$f(-x) = \frac{5}{4}x + 3\frac{5}{4}$



14. Given: $f^{-1}(-3)=1$

$5+f(4t-3)=2$

$f(4t-3)=-3$

$4t-3=f^{-1}(-3)$

$4t-3=1$

$4t=4$

$t=1$

15. $f(x)=\frac{1}{x}$ $\quad \frac{\Delta f}{\Delta x}=-\frac{1}{10}$

$[1,t]$

$\frac{\Delta f}{\Delta x}=-\frac{1}{10}$

$\frac{f(t)-f(1)}{t-1}=-\frac{1}{10}$

$\frac{t}{t}\cdot\frac{\frac{1}{t}-1}{t-1}=-\frac{1}{10}$

$\frac{1-t}{t^2-t}=\frac{-1}{10}$

$10-10t=t-t^2$

$t^2-11t+10=0$

$(t-10)(t-1)=0$

$t=\{1,10\}$, but $t>1$, otherwise $\Delta x=0$

$t=10$