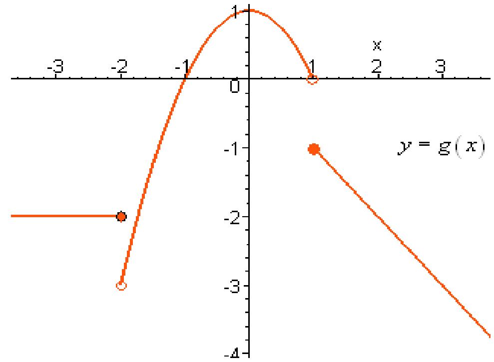
Some Solutions to Problems in Part 1

Problem 3.

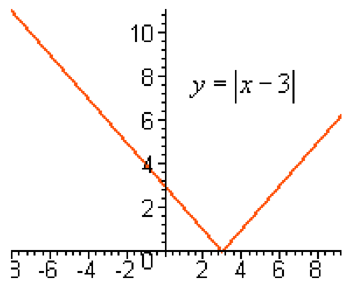
1) $D_g = \mathbb{R}$

$R_g = (-\infty, 1]$



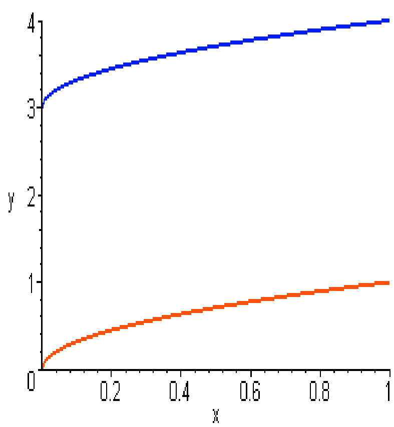
2) $D_y = \mathbb{R}$

$R_y = [0, \infty)$

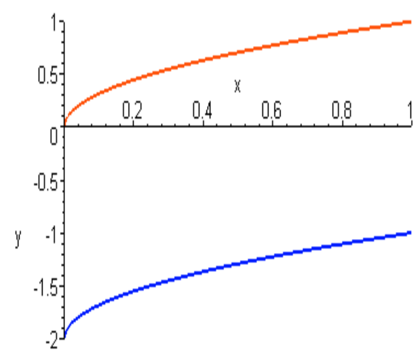


Problem 4.

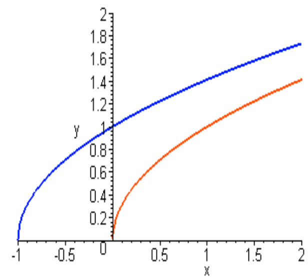
1)



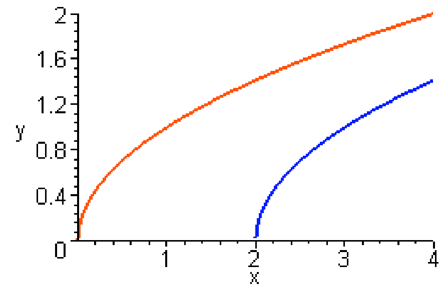
2)



3)



4)



<u>Problem 5</u>: $f(x)=1-x+x^2$ and $g(x)=\sqrt{x}$

a) $f(g(x))=1-\sqrt{x}+\left[\sqrt{x}\right]^2=1-\sqrt{x}+x$

b) $g(f(x))=\sqrt{f(x)}=\sqrt{1-x+x^2}$

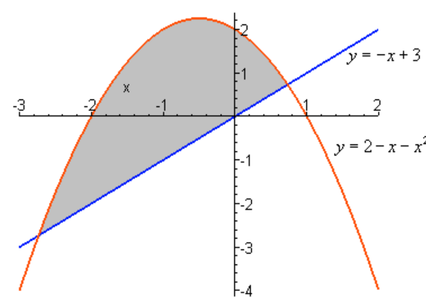
c) $$\frac{f(1+h)-f(1)}{h}=\frac{\left[1-(1+h)+(1+h)^2\right]-\left[1-1+1^2\right]}{h}$$

$$=\frac{-h+\left(1+2h+h^2\right)-1}{h}=\frac{h+h^2}{h}=1+h$$

d) $$\frac{g(x+h)-g(x)}{h}=\frac{\sqrt{x+h}-\sqrt{x}}{h}=\frac{(x+h)-x}{h\left(\sqrt{x+h}+\sqrt{x}\right)}=\frac{1}{\sqrt{x+h}+\sqrt{x}}$$

<u>Problem 6</u>:

Sketch: see left!



intersection:

$$x=2-x-x^2$$

$$x^2+2x-2=0$$

$$x=\frac{-2\pm\sqrt{4-(-8)}}{2}=\frac{-2\pm 2\sqrt{3}}{2}=-1\pm\sqrt{3}$$

points: $\left(-1+\sqrt{3}, f\left(-1+\sqrt{3}\right)\right)$ and $\left(-1-\sqrt{3}, f\left(-1-\sqrt{3}\right)\right)$.