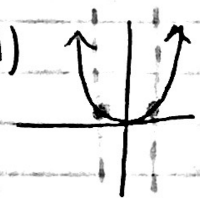
Pg. 214

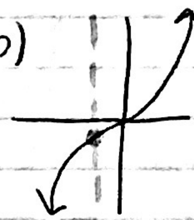
3.2 Graph of a function

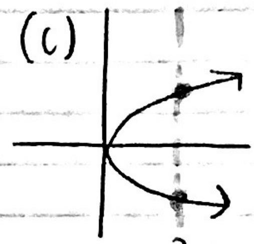
* How to tell if a graph is a function: use the vertical line test

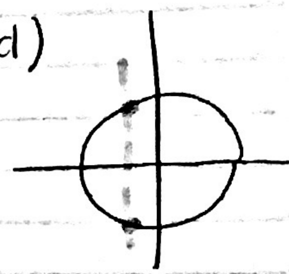
<u>Theorem</u>: A set of points in the xy-plane is the graph of a function iff every vertical line intersects the graph in @ most one point.

example 1)

(a)

$y = x^2$
↑
Function

(b)

$y = x^3$
↑
Function

(c)

$x = y^2$
↑
Not a function

(d)

$x^2 + y^2 = 1$
↑
not a function

<u>Obtaining info from a graph</u>

example. 2) look @ figure 15 on pg. 215

a) $f(0) = 4$
$f\left(\frac{3\pi}{2}\right) = 0$
$f(3\pi) = -4$

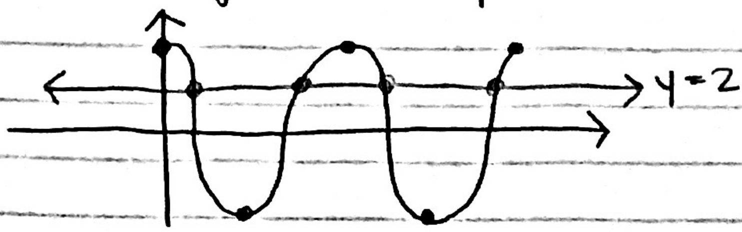
* Find where the y-value is when $x = 0$, $x = 3\pi/2$, $x = 3\pi$

(b) Domain: (where are the x-values on graph)
interval: $[0, 4\pi]$
set: $\{x \mid 0 \leq x \leq 4\pi\}$

(c) Range: interval: $[-4, 4]$
set: $\{y \mid -4 \leq y \leq 4\}$

(d) x-int: $(\pi/2, 0)$, $(3\pi/2, 0)$, $(5\pi/2, 0)$, $(7\pi/2, 0)$
y-int: $(0, 4)$

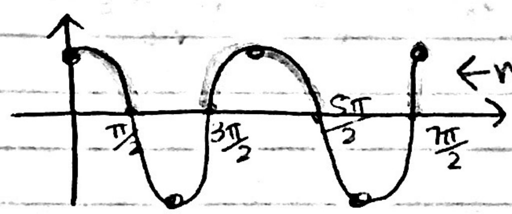
(e) How many times does $y=2$ intersect the graph? $\boxed{4}$



(f) what values of x does $f(x)=-4$ ← y-value

$x=\pi$ and $x=3\pi$

(g) what values of x is $f(x)>0$ ← find x-values when $y>0$



← where $y>0$ so

$[0,\frac{\pi}{2})\cup(\frac{3\pi}{2},\frac{5\pi}{2})\cup(\frac{7\pi}{2},4\pi]$

or $0\leq x<\frac{\pi}{2}$ or $\frac{3\pi}{2}<x<\frac{5\pi}{2}$ or

$\frac{7\pi}{2}<x\leq 4\pi$

ex.3) consider: $f(x)=\dfrac{x+1}{x+2}$

(a) Domain: $\{x \mid x\neq -2\}$

(b) Is $(1,\frac{1}{2})$ a point on the graph? $\boxed{NO}$

if $f(1)=\dfrac{1+1}{1+2}=\dfrac{2}{3}$ so $(1,\frac{2}{3})$ is not $(1,\frac{1}{2})$

(c) If $x=2$, what is $f(x)$? what point?

$f(2)=\dfrac{2+1}{2+2}=\dfrac{3}{4}$ point: $(2,\frac{3}{4})$

(d) If $f(x)=2$ what is x? what point?

$2=\dfrac{x+1}{x+2}$ $\quad 2(x+2)=x+1$ $\quad x=-3$

$2x+4=x+1$ $\quad$ point: $(-3,2)$

(e) what are the x-int? (when $f(x)=0$)

$0=\dfrac{x+1}{x+2}$ so $0=x+1$

$x=-1$ $\quad \boxed{(-1,0)}$