Domain and Range of a function

Domain: *A list of permitted x-values* (or non-permitted x-values) ***Range:*** *A list of permitted y-values* (or non-permitted y-values)

If no x-restrictions exist – then graph has a domain of $x \in R$ *(x is any real number)*

Notation: *Inequality versus set notation* $>$ *or* $<$ → *not = to curved brackets ( )*

$\leq$ *or* $\geq$ → *since = square brackets [ ]*

From Math 9: $\geq, \leq$ *were solid dots on a number line*

but $<, >$ *were hollow dots on a number line*

Write the following using set notation

a) $-6 \leq x \leq 18$

both = $[-6, 18]$

b) $-3 < x \leq 12$

only right = $(-3, 12]$

c) $3 \leq x < 8$

only left = $[3, 8)$

d) $x < 17$

left is -∞, can't = that
$(-\infty, 17)$

e) $x \geq -4$

right is ∞, can't = that
$[-4, \infty)$

f) $x < 19$

left is -∞, can't = that
$(-\infty, 19)$

Write the following using inequalities (assume these are domain and x's)

a) $[3, 19]$

both = $3 \leq x \leq 19$

b) $(-12, 180]$

right= $-12 < x \leq 180$

c) $[-8, 32)$

left= $-8 \leq x < 32$

we don't usually include ∞ in inequality statement … so these are 1-sided inequalities.

d) $(-\infty, 14)$

$x < 14$

e) $[6, \infty)$

$6 \leq x$ *or* $x \geq 6$

f) $(-\infty, -15]$

$x < -15$

What is the domain and range of a y = mx + b line? (why?)

Lines go up/down left/right forever so $D: x \in R$ $R: y \in R$

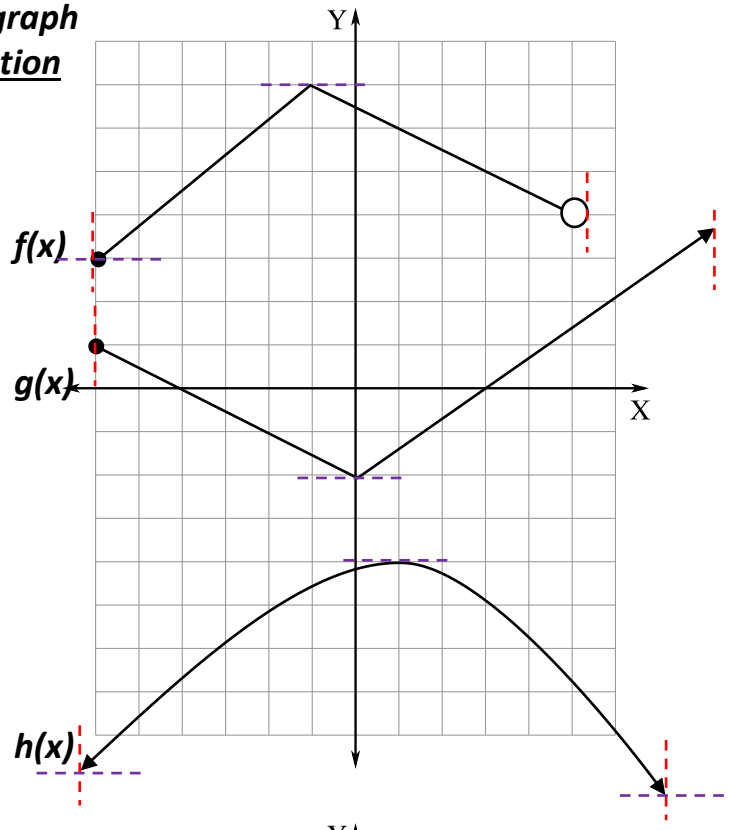
Why is this statement NOT allowed $[6, \infty]$ ***Only Chuck Norris can reach infinity*** 😊

We will focus our work on finding the domain and range of a given graph

Key things to look for: ***domain:*** ***farthest left to farthest right***

Range: ***lowest point to highest point***

f(x), g(x) and h(x) are shown on the given graph
state the domain and range using <u>set notation</u>



f(x): ***D:*** ***[-6, 5)*** ***R:*** ***[3, 7]***

dashed lines left/right high/low of graph
left =, right not, low =, high = ***note brackets***

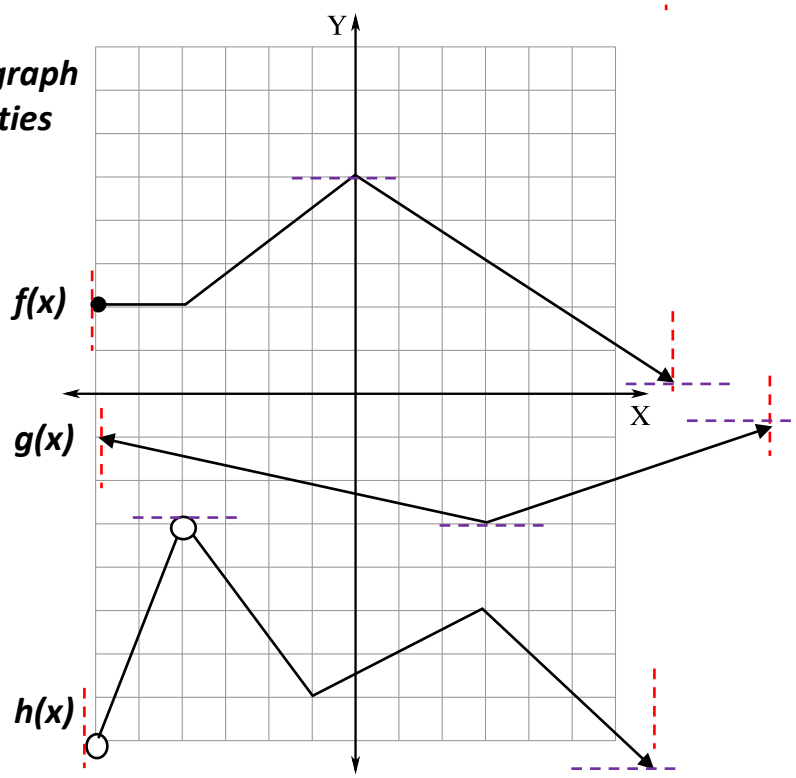
g(x): ***D:*** ***[-6, ∞)*** ***R:*** ***[-2,∞)***

left =, right →∞
low = high →∞

h(x): ***D:*** ***(-∞,∞)*** ***R:*** ***(-∞, -4]***

arrows x's both sides
high =, no low

f(x), g(x) and h(x) are shown on the given graph
state the domain and range using inequalities



f(x): ***D:*** ***-6 ≤ x*** ***R:*** ***y ≤ 5***

left =, no right
high =, no low

g(x): ***D:*** ***x ε R*** ***R:*** ***y ≥ -3***

no left or right
low =, no high

****h(x): left not =, no right***
High not =, no low
Hollow dot (-4, -3)

D: ***x > -6, x≠ -4*** ***R:*** ***y < - 3***

Assignment = worksheet

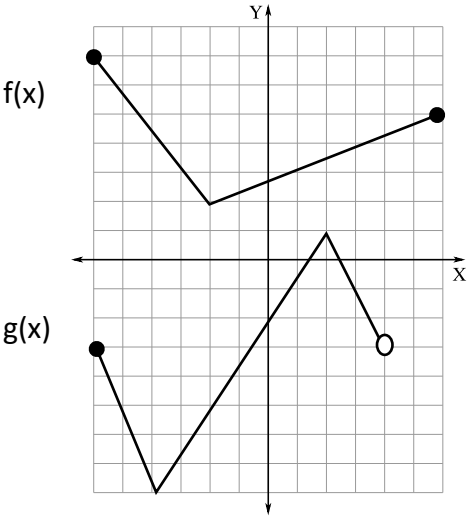
Domain and Range

1) Write using set notation

a) $-6 \le x < 10$ b) $-10 < x < 100$ c) $-4 \le x < 8$

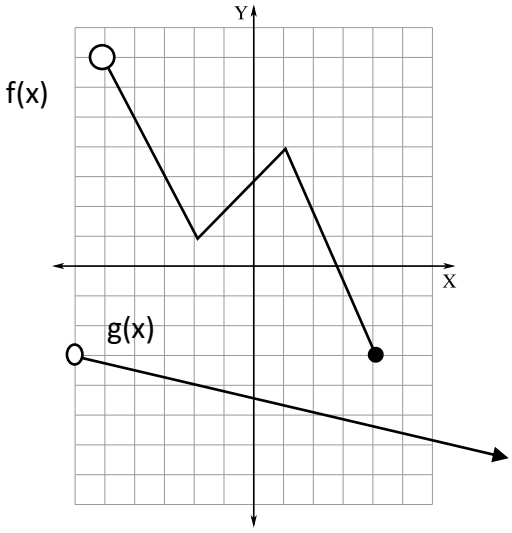
d) $x > 12$ e) $x < 10$ f) $x \ge -3$

2) Use <u>set notation</u> to state the domain and range of the functions shown on the axis



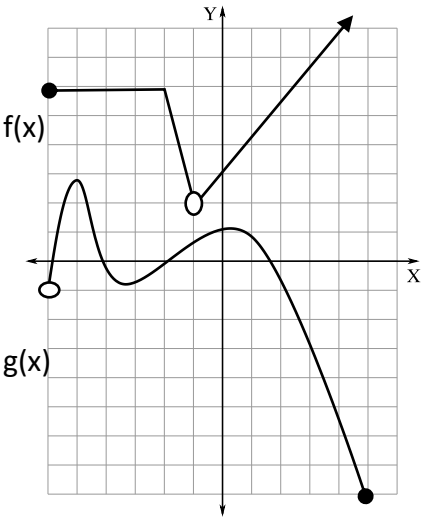
f(x): D: R:

g(x): D: R:



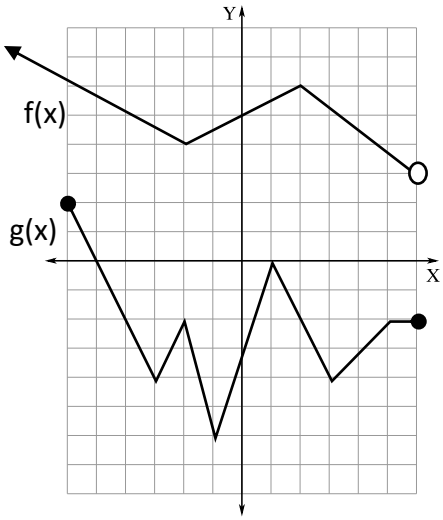
f(x): D: R:

g(x): D: R:



f(x): D: R:

g(x): D: R:



f(x): D: R:

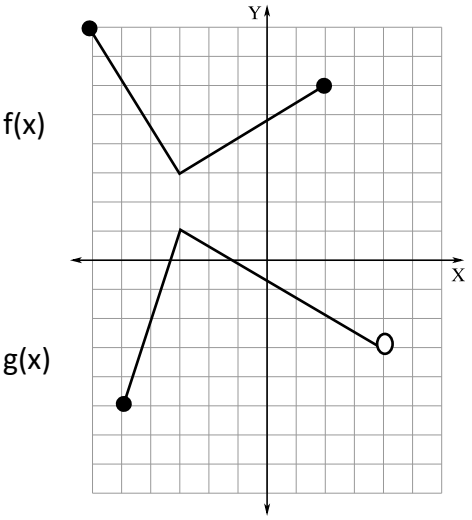
g(x): D: R:

3) Write using inequalities

a) [-4, 2] b) (-3, 10] c) [2, ∞)

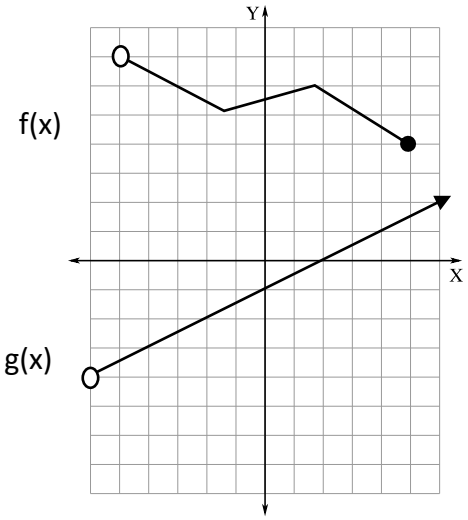
d) (-∞. 3) e) [12, 110) f) (3, ∞)

4) Use inequalities to state the domain and range of the functions shown on the axis



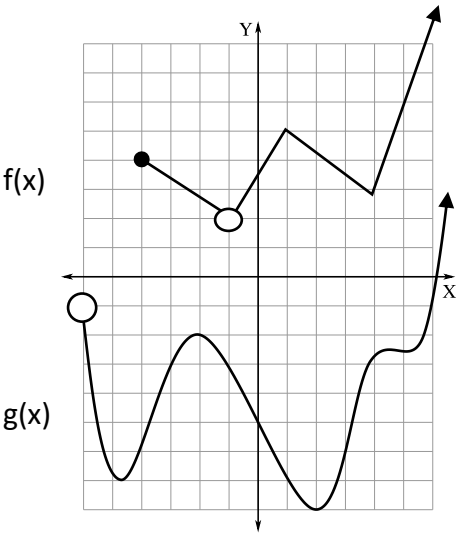
f(x): D: R:

g(x): D: R:



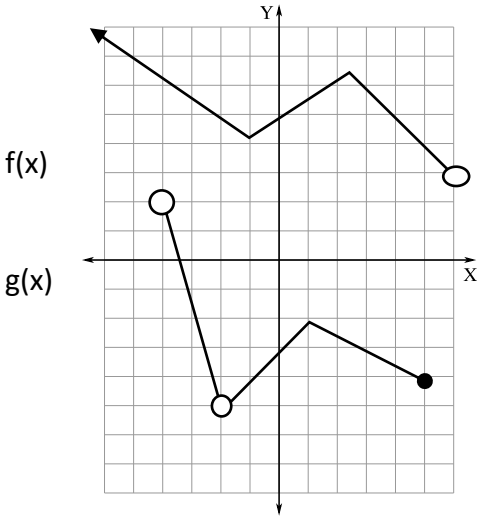
f(x): D: R:

g(x): D: R:



f(x): D: R:

g(x): D: R:



f(x): D: R:

g(x): D: R:

Also try text Page 294

#7a) b) 9a) b)

c) d) c) d)