Written Assignment Unit 4
Math 1201- College Algebra.

Instructor - Casmir Onyeneke

September 2021

Question 1

Composite Functions

Question Statement: What can be said about the domain of the function f o g where $f(y) = \frac{4}{y-2}$ and $g(x) = \frac{5}{3x-1}$? Express in terms of a union of real numbers.

Solution

$$f(y) = \frac{4}{y-2}$$

$$g(x) = \frac{5}{3x-1}$$

The composite function f o g can be expressed as

$$f \ o \ g = f(g(x))$$

$$f \ o \ g = f\left(\frac{5}{3x-1}\right)$$

$$f \ o \ g = \frac{4}{\frac{5}{3x-1} - 2}$$

$$f \ o \ g = \frac{4(3x-1)}{5 - (6x-2)}$$

$$f \ o \ g = \frac{12x-4}{5+2-6x}$$

$$f \ o \ g = \frac{12x-4}{7-6x}$$

The Domain of this composite function is:
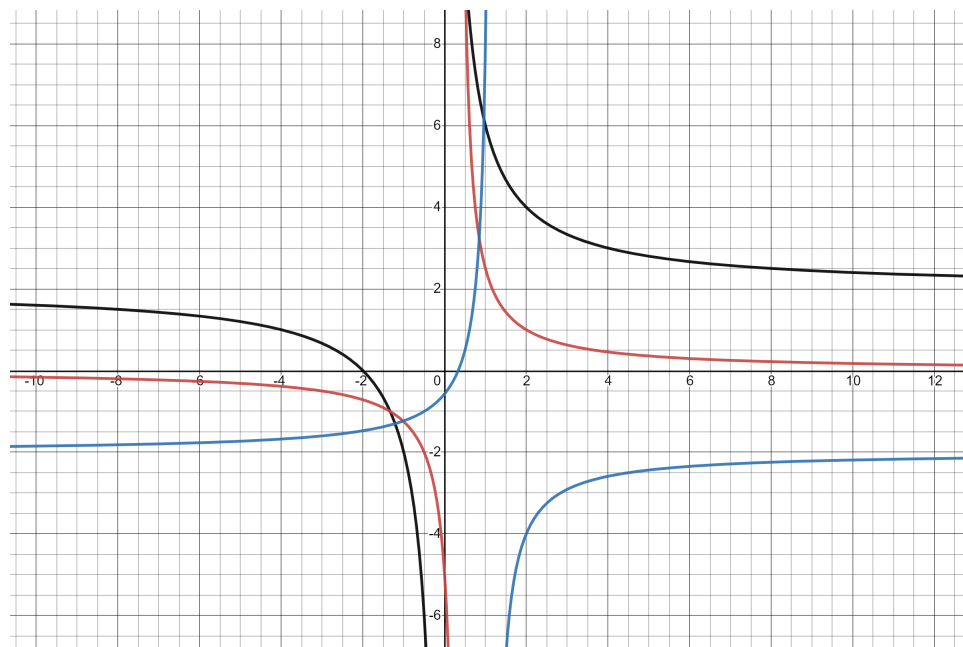
$$7 - 6x \neq 0$$

$$6x \neq 7$$

$$x \neq \frac{7}{6}$$

So therefore the domain expressed in interval notation is

$$(-\infty, \frac{7}{6}) \cup (\frac{7}{6}, \infty)$$

Below is the graph of f, g and $f \; o \; g$

$$f(y) = \frac{4}{y - 2}$$

$$g(x) = \frac{5}{3x - 1}$$

$$f \; o \; g = \frac{12x - 4}{7 - 6x}$$

Question 2

Inverse Functions
Question Statement: Find the inverse of the function $f(x) = 4 + \sqrt{x - 2}$
state the domains and ranges of both the function and the inverse function in terms of intervals of real numbers.
Solution

$$f(x) = 4 + \sqrt{x - 2}$$

We can say that $f(x) = y$

$$y = 4 + \sqrt{x - 2}$$

Making x the subject of the equation

$$y = 4 + \sqrt{x - 2}$$

subtract 4 from both the LHS and RHS

$$y - 4 = \sqrt{x - 2}$$

$$\sqrt{x - 2} = y - 4$$

Square both the LHS and RHS

$$(\sqrt{x - 2})^2 = (y - 4)^2$$

$$x - 2 = (y - 4)^2$$

Add 2 to both the LHS and RHS

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

Therefore the inverse function of $f(x) = 4 + \sqrt{x - 2}$ is $f^{-1}(x) = (x - 4)^2 + 2$

Question 3