PreCalculus UNIT F

FUNCTIONS – journal questions – MCR

Summarize everything you need to know about these topics. Use examples and concise (not long – but with enough detail) explanations. Include definitions and diagrams if necessary

1. RELATIONS and FUNCTIONS

   Definitions of relations & functions. Talk about Vertical Line Test for graphs. Talk about what is the key feature of the equation that gives it away that the relation will not be a function. Include examples of both functions and non-functions (graphs, equations, mapping diagrams, sets of ordered pairs, real-life scenarios).

2. FUNCTION NOTATION
   a. Discuss how the notation may be confused with multiplication, talk about what you should think of instead.
   b. Show how to evaluate and simplify equations with different inputs.

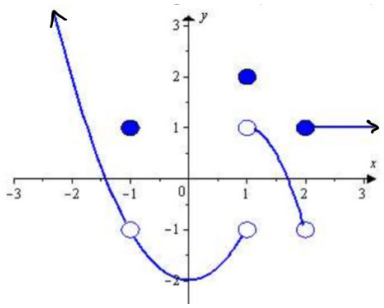
   $f(x) = 2(x + 1)^2 - 5$

   i. $f(3) - f(0)$
   ii. $2f(5) - 2$
   iii. $f(v) + f(6 - v)$ expand and collect like terms in the end

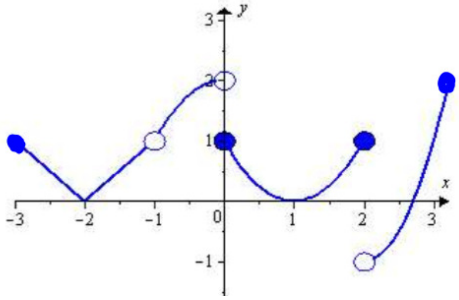
   c. Include a discussion of how to rearrange the area of a trapezoid formula for height as a function of area.

3. DOMAIN & RANGE
   a. Explain the symbols used in SET NOTATION. Shade in the values on a number line. Which one of these can you also write in INTERVAL NOTATION? Show how.
      i. $\{x \in \mathbb{R} \mid x < 1 \cup 4 \le x < 6\}$
      ii. $\{x \in \mathbb{Z} \mid -4 \le x < 3 \cap 0 < x \le 6\}$
   b. Define domain and range. Then explain how to find both domain and range from a graph (use both set notation and interval notation)

   i.



   ii.



   c. Find domain from equation $f(x) = \frac{\sqrt{6-2x}}{x^2+7x}$ (use both set notation and interval notation). Make a note that range is hard to do on equations without seeing the graph.

4. NEW FUNCTIONS

   Copy/Paste the functions from assignment into your journal. List A is needed for this unit. List B is needed later.

5. TRANSFORMATIONS
   a. Create a summary of what each constant controls in $y = af(k(x-d)) + c$
   b. Identify the parent function and the transformations applied from an equation $f(x) = -0.5|3x - 6| + 8$. Sketch and explain how to use image points.
   c. Add in IMPORTANT notes
      - Transformations are only visible if x appears once Ex. Show what to do to find the transformations of $y = -3x^2 + 6x$
      - Always apply stretch/compress/reflect before shifts
      - The importance of factoring out the coefficient of x first, otherwise horizontal shift is not visible (ie. There must be a bracket between k number and x)
      - If you are just doing a quick sketch (ie. when scale is not shown on graph) just do reflections and shifts and skip stretches and compressions

6. INVERSES
   a. Definition of ONE TO ONE FUNCTION. Show examples and counterexamples.
   b. Definition of INVERSE function (*Informally*: undo each other. *Formally:* If f and f^{-1} are one-to-one then they are inverses of each other if and only if $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$ for each x in the corresponding domains. *Graphically*: images in y=x line.) Show examples of informal, formal and graphical representation of an inverse.
   c. Find inverse function ALGEBRAICALLY $f(x) = 2x^2 - 4x + 9$ include domain restriction discussion to ensure everything is one-to-one. Add in IMPORTANT notes
      - Notation f^{-1} is not a negative exponent, explain.
      - Please add a note that when you switch x and y you must state that what you're finding is the inverse, ie. Once the swap happened, it is not the same as the original function in the line above anymore.