PreCalculus UNIT 1

FUNCTIONS – journal questions (MHF)

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. FUNCTION OPERATIONS

a. Copy the following into your journal – you will need this notation when we study trig and log functions:

Conventions used in function notation

There are times when it is customary to omit the parentheses when writing certain functions.

$\sin 2x$ means

$\sin x^2$ means

$\sin^2 x$ means

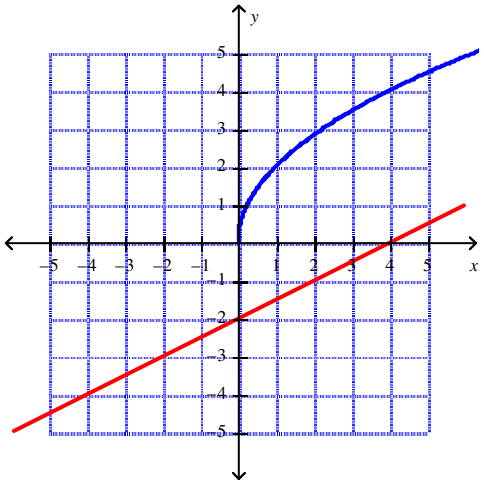
$\sin 2x+3$ means

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

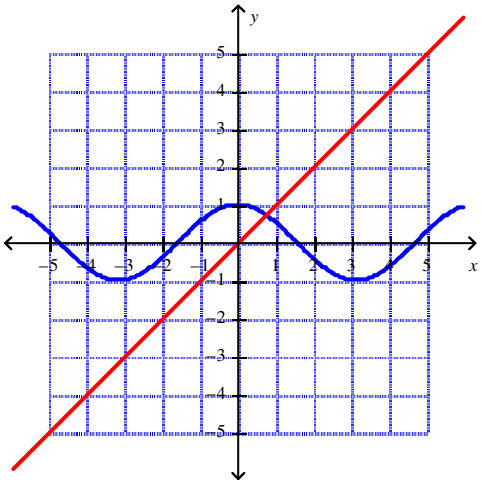
$(g \circ f)(x) =$

Sketch the combined version of the following graphs under the given operations.

b. Product $f(x) \times g(x)$



c. Sum $h(x)+k(x)$



Perform the following operations on the given functions $f(x)=2x+3$ and $g(x)=-x^2+5$. Explain notation when needed

d. $f-g$

e. $(f \times g)(x)$

f. $(f \circ g)(1)$

g. $(g \circ f)(x)$

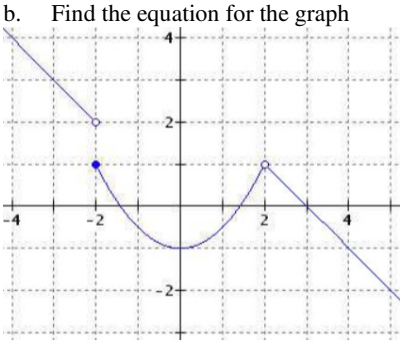
h. $g(g(x))$

2. PIECEWISE functions

a. Sketch the following

$$f(x)=\begin{cases} 3 & x<-2 \\ x^3 & -2 \le x \text{ and } x<3 \\ 2x+1 & 3 \le x \end{cases}$$

b. Find the equation for the graph



c. Set up a model for the word problem (Record key things to know about the set up)

Volume purchasing allows a manufacturer to reduce its production costs. If the company buys less than 20 red widgets, a key component of their product, they pay $10 per piece. The price drops to $8 if they purchase any amount from 20 to less than 50. The best price they can get is $7 per red widget for orders of 50 or more.

d. ABSOLUTE VALUE as PIECEWISE:

i. Sketch $y=|x|$ and record the result in piecewise notation

ii. Explain how to find the piecewise representation without sketching of $y=|2x-4|$ and of $y=|x^2-4|$. Sketch to verify.

3. INEQUALITIES
   a. Explain how to solve a LINEAR inequality $-2x+5>4$
      Note that sign flips when… record the solution in both set notation and interval notation.
   b. Solve ABSOLUTE VALUES and draw a picture of the solutions
      i. $|x-2|=9$
      ii. $\left|\frac{m}{2}\right|+5\geq 6$
      iii. $3|x+5|\leq 6$
   c. Record some notes about Absolute Values:
      I. once the absolute value is isolated there is always symmetry to the solution that follows the form
      II. you must isolate the absolute value before you do conjunctions/and/ "less is nest" and disjunctions/or/ "more is or"
      III. the note II is only helpful if radius from note I. is positive. Talk about what happens if the number is negative
      IV. the note II is only helpful for LINEAR inequalities

$$|x-\text{centre}|\begin{matrix}<\\=\\>\end{matrix}\text{radius}$$

   d. Explain how to solve NON LINEAR inequalities and draw a picture of the solutions
      i. $9x^2+31x\leq -12$
      ii. $4x^2+4x+1>0$
4. PROPERTIES of functions
   a. INCREASING, DECREASING, CONSTANT, intervals example (include how to record it properly)
   b. Look up a formal definition of MONOTONICITY and how it helps determine if there is a unique inverse
   c. SYMMETRY definition of ODD functions, EVEN functions, NEITHER (include graphical and algebraic discussion for each)
   d. END BEHAVIOUR examples of graphs and how to properly record this.
   e. CONTINUOUS versus DISCONTINUOUS function examples