

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

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

- a. $f - g$ b. $(f \times g)(x)$ c. $(f \circ g)(1)$ d. $(g \circ f)(x)$ e. $g(g(x))$

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

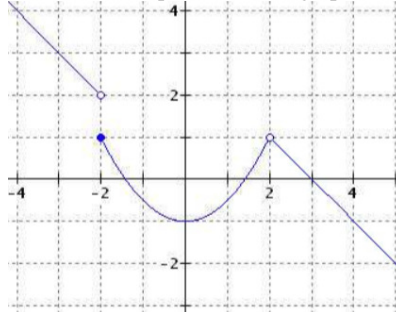
Conventions used in function notation			
There are times when it is customary to omit the parentheses when writing certain functions.			
$\sin 2x$	means	$\sin(2x)$	composition
$\sin x^2$	means	$\sin(x^2)$	composition
$\sin^2 x$	means	$(\sin x)^2$	multiplication
$\ln 5x$	means	$\ln(5x)$	composition
$\ln x^4$	means	$\ln(x^4)$	composition

2. PIECEWISE functions

a. Sketch the following

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

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

	=
$ x - \text{centre} $	< 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.