BECA / Huson / 11.1 IB Math SL Name:
3 October 2017

Function Operations with Proper Notation

Review of material to date

The inverse of a function

1. Given $f(x) = 3x + 2$. What is the inverse of the function $f^{-1}(x)$?
   (a) Rewrite the function reversing x and y. (assume that y and $f(x)$ are interchangeable)

   (b) Solve for x. Finish by putting y on the left side of the equality.

   (c) State the answer as $f^{-1}(x)$ equals an expression.

Function substitution

2. Given $f(x) = 3x + 2$. What is $f(2x - 1)$?
   (a) Perform the substitution, putting $2x - 1$ in parenthesis.

   (b) Simplify, beginning each line with a leading equals sign if it is equal to the line above.

Function composition

3. Given $f(x) = x^2 + 2$ and $g(x) = x^2$ What is $(f \circ g)(x)$?
   (a) Rewrite $f \circ g$ and perform the inner substitution (i.e. for g): $f(g(x)) = f(x^2)$

   (b) Perform the substitution, putting x^2 in parenthesis (and using a leading equals sign).

   (c) Simplify, beginning each line with a leading equals sign.

Unscaffolded practice problems

Write answers on loose leaf lined paper using the notation practiced in the previous section.

The inverse of a function

Derive the inverse of each function. Simplify the expression.

4. $f(x) = \frac{1}{2}x + 2$
5. $f(x) = \frac{2}{3}x^2 - 3$
6. $f(x) = \sqrt{x-1} + \frac{1}{2}$

Function substitution

7. Given $f(x) = x^2 - 1$. Simplify $f(2x - 1)$?
8. Given $f(x) = x^3$. Simplify $f(x + 1)$?
9. Given $f(x) = 4 - (2x^2 + x)$. Simplify $f(\frac{1}{2}x - 3)$?

Function composition

In each exercise, perform the composition $f \circ g$ and simplify.

10. Given $f(x) = \frac{1}{2}x^2 + 1$ and $g(x) = 2x$
11. Given $f(x) = \sqrt{x-4}$ and $g(x) = x^2 + 4$
12. Given $f(x) = \dfrac{1-x}{x^2} + 1$ and $g(x) = 2x + 3$

New material: factoring quadratics

Expand from vertex form to standard form, $ax^2 + bx + c$ where $a, b, c \quad \epsilon R$

13. $f(x) = (x-2)^2 + 6$
14. $f(x) = (x-5)^2 - 9$

Factor each function.

15. $f(x) = x^2 + 5x + 6$
16. $f(x) = x^2 - 7x + 10$
17. $f(x) = x^2 + 6x + 8$
18. $f(x) = x^2 - 2x - 8$
19. $f(x) = x^2 - 7x - 8$
20. $f(x) = x^2 + 3x - 10$