UNIVERSITY OF NAIROBI
Assignment #2 (of 25-09-2019)
SMA 103- Calculus I

INSTRUCTIONS: Attempt ALL QUESTIONS and KINDLY submit your solutions before 11:00 am on 9/10/2019 and *Enjoy as many problems as possible!*Late submission NOT ACCEPTED.

1. If $f(x) = x^2 + 2x - 5$ and $g(x) = x^3$, find: fog, gof, $fog(2)$ and $gof(-4)$.

2. Write the function $\sqrt{3x - 5}$ as the composition of two functions.

3. If $f(x) = 2x$ and $g(x) = \frac{1}{x-1}$, find the solution of the equation
$$(fog)(x) = (gof)(x)$$

4. If $f(x) = \frac{2}{x+1}$ and $g(x) = 3x$, find: fog, gof, $fog(1)$ and $gof(2)$.

5. If $f(x) = 2x^3 - x^2 + 4$ and $g(x) = 3$, find: fog, gof, $fog(3)$ and $gof(4)$.

6. If $f(x) = x^3$ and $g(x) = x^2$, find: fog, gof, $fog(3)$ and $gof(4)$.

7. If $f(x) = g(x) = \frac{1}{x}$, find: fog, gof, $fog(0)$ and $gof(3)$.

8. If $f(x) = x$ and $g(x) = x^2 - 4$, find: fog, gof, $fog(3)$ and $gof(4)$.

9. If $f(x) = \frac{2}{x+1}$ and $g(x) = 3x$, find the solution of the equation
$$(fog)(x) = (gof)(x)$$

10. If $f(x) = x^2$ and $g(x) = \frac{1}{x^2-3}$, find the solution of the equation
$$(fog)(x) = (gof)(x)$$

11. Write the function $(x^3 - x^2 + 2)^7$ as the composition of two functions.

12. Write the function $(8 - x)^4$ as the composition of two functions.

13. Write the function $\sqrt{1 + x^2}$ as the composition of two functions.

14. Write the function $\frac{1}{x^2-4}$ as the composition of two functions.

15. Find the domain and range of

$$f(1) = -1, f(2) = 3, f(4) = -1$$

then represent the function on the graph.

16. Let $f(x) = \frac{x}{x-2}$. Find a function $y = g(x)$ so that $(fog)(x) = x$.

17. Let $f(x) = 2x^3 - 4$. Find a function $y = g(x)$ so that $(fog)(x) = x + 2$.

18. Find the inverse of each of the following functions:

    (a) $f(x) = \frac{1}{2}x + 1$

    (b) $g(x) = 5x + 8$

    (c) $h(x) = \frac{1}{4}x - 5$

    (d) $V(x) = 3x + 2$

    (e) $W(x) = 9x + 3$

19. If $f(x) = 3x + 2, g(x) = x - 3$ and $h(x) = 4x - 2$, find:

    (a) $fogoh(x)$

    (b) $fohog(x)$

    (c) $hofog(x)$

    (d) $fogoh(3)$

    (e) $fohog(2)$

    (f) $hofog(1)$

20. Show that the following pairs of functions are inverses of each other:

    (a) $f(x) = e^x$ and $g(x) = lnx$

    (b) $f(x) = a^x$ and $g(x) = log_a x$ $\qquad a, x > 0$

    (c) $f(x) = (2x + 8)^3$ and $g(x) = \frac{1}{2}(x - 8)^{\frac{1}{3}}$

    (d) $f(x) = \frac{9}{5}x + 32$ and $g(x) = \frac{5}{9}(x - 32)$

    (e) $f(x) = 3x + 2$ and $g(x) = \frac{x-2}{3}$

"Small minds discuss people.Average minds discuss events.Great minds discuss ideas. Really great minds discuss Bible and Mathematics!"

************************Mathematics can smile!***********************