UNIVERSITY OF NAIROBI
Assignment #1 (of 13-09-2019)
SMA 103- Calculus I

INSTRUCTIONS: Attempt ALL QUESTIONS and KINDLY submit your solutions before 11:00 am on 2/10/2019 and *Enjoy as many problem9s as possible!*Late submission NOT ACCEPTED.

1. Define the following terms giving an example in each case:
   (a) A function
   (b) Injective function
   (c) Surjective
   (d) Bijection
   (e) Polynomials
   (f)Rational functions
   (g) Trigonometric functions
   (h) Exponential functions
   (i) Hyperbolic functions
   (j)Even function
   (k) Odd function
   (l)Graph of a function
   (m)Increasing function
   (n)Decreasing function
   (o) Linear function
   (p)Algebraic function
   (q) Transcendental function
   (r)Power function
   (s) Composite function
   (t)Periodic function
   (u) Floor function
   (v)Ceiling function

2. Sketch the graphs of:
   (a) $f(x) = 2^x$
   (b) $g(x) = (\frac{1}{2})^x$
   (c) $h(x) = 3^x$
   (d)$f(x) = \frac{1}{x^2}$
   (e) $f(x) = x^2 + 4$
   (f) $f(x) = e^x$

3. Find the domain and range of the following functions and draw the graph for each:
   (a) $h(x) = 4 - x^2$
   (b) $G(x) = -2\sqrt{x}$
   (c) $H(x) = \sqrt{4 - x^2}$
   (d) $F(x) = \frac{1}{x-1}$
   (e) $v(x) =\mid x - 1 \mid$
   (f) $f(x) = x^2$
   (g) $v(x) = \sqrt{4 - x}$
   (h) $f(x) = \frac{1}{x}$
   (i) $v(x) = \sqrt{1 - x^2}$
   (j) $f(x) = \sqrt{x}$

4. Verify that $f(x) = 2x^3 - 1$ and $g(x) = \sqrt[3]{\frac{x+1}{2}}$ are inverses of each other.

5. Find the domain and range of the following functions:
   (a) $\frac{1}{(x-2)(x-3)}$ (b) $\frac{1}{\sqrt{1-x^2}}$

6. Solve:
   (a) $8 = e^{x+3}$ (b) $ln(2x-3) = 5$

7. Solve for the unknowns in :
   (a) $(y-2)(y+3) = 14$ (b)$9t^4 - 12t^2 + 4 = 0$
   (c) $5^{2x} - 6 \times 5^x + 5 = 0$ (d) $4^x - 3(2^x) + 2 = 0$

8. State the Vertical Line Test and use it to determine whether the following are functions or not:
   (a)$x^2 + y^2 = 1$ (b) $y = \sqrt{1-x^2}$ (c) $y = -\sqrt{1-x^2}$

9. Sketch the following functions:
   (a)
$$f(x) = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

   (b)
$$f(x) = \begin{cases} -x, & x < 0 \\ x^2, & 0 \leq x \leq 1 \\ 1, & x > 1 \end{cases}$$

10. State The Horizontal Line Test for One-to-one functions.

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

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