COMSATS University Islamabad
Attock Campus
Department of Mathematics
Assignment # 01

Class: BCS (3ʳᵈ)
Subject: Calculus and Analytic Geometry
Instructor: Dr. Atiq ur Rehman

Due Date: 19-09-2024 (1140PST)
Course Code: MTH104
Marks: 9

Note: Every student must submit a handwritten assignment.

Question # 1: Replace the comma between each pair of real numbers with $<$, $>$, or =.

i. -2, -5
ii. $0.66, \frac{2}{3}$
iii. $\pi, \frac{22}{7}$
iv. $\sqrt{2}, 1.42$
v. $\sqrt{5} - 2, 2 - \sqrt{5}$
vi. $\frac{11}{20}, 0.55$
vii. $1.618, \frac{1+\sqrt{5}}{2}$

Question # 2: Rewrite the expressions without using symbols for absolute values.

i. $\left| \pi - \frac{22}{7} \right|$
ii. $|5 - x|$ if $x > 8$.
iii. $|3 - \pi|$
iv. $|-16 - x^2|$

Question # 3: Solve the inequalities and express the solutions in terms of intervals.

i. $-1 < \frac{3-7x}{4} \leq 7$
ii. $\left| \frac{2x+3}{6} \right| < 2$
iii. $x^2 - 10x \leq 200$
iv. $5 + \sqrt{x} < 1$

Question # 4: Use any software to sketch the graph of the following equation.

i. $y = 4x - 3$
ii. $y = \sqrt{x} - 1$
iii. $4y = x^2$
iv. $x^2 + y^2 = 16$

Question # 5: Find the largest subset of $\mathbb{R}$ that can serve as the domain of the given function.

(i) $f(x) = \sqrt{4 - x^2}$

(ii) $g(x) = \frac{4x+8}{6x^2+13x-5}$

(iii) $h(x) = \log(32 - 4x^2)$

(iv) $k(x) = \frac{1}{\sqrt{x-1}+\sqrt{1-x}}$

Question # 6: Sketch the graph and determine the domain and range of the given function.

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

b) $g(x) = x + |x|$

c) $h(x) = \begin{cases} 3 & \text{if } x \text{ is an integer} \\ -1 & \text{if } x \text{ is not an integer} \end{cases}$

d) $k(x) = \begin{cases} -2x - 3 & \text{if } x \leq -1 \\ x^3 & \text{if } |x| < 1 \\ 2x & \text{if } x \geq 1 \end{cases}$