KING SAUD UNIVERSITY
DEANSHIP OF COMMON FIRST YEAR
BASIC SCIENCES DEPARTMENT
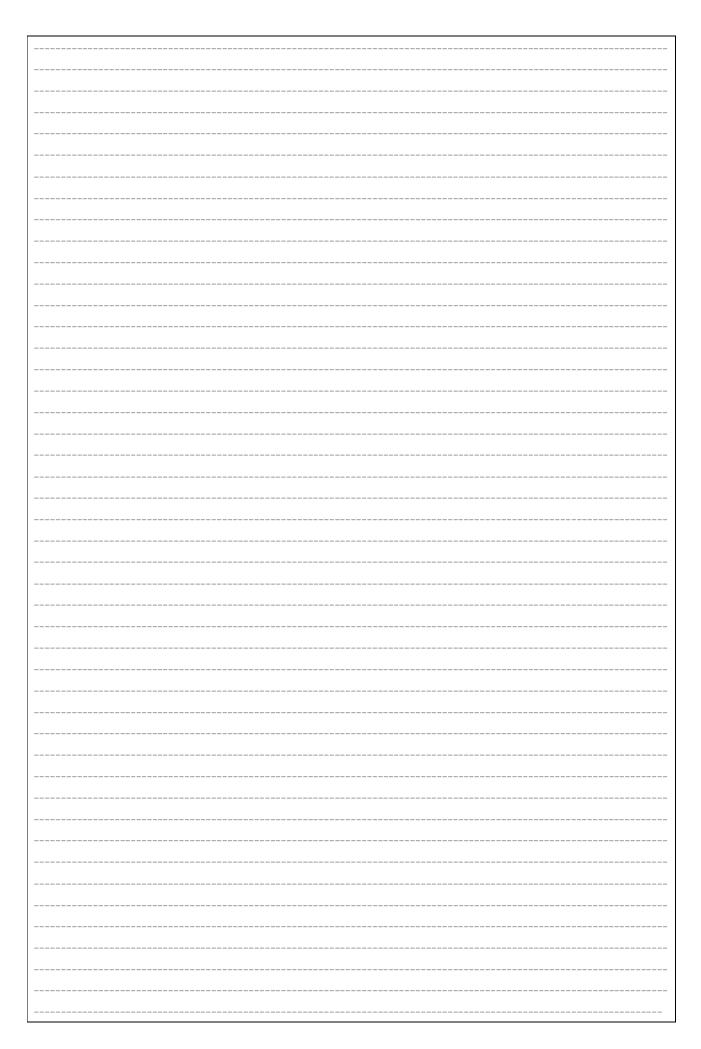
جـامـعـة
الملك سعود
King Saud University
السنة الأولى المشتركة

MATH 101   HW # 1 / FIRST SEMESTER 1442   Date: 24/09/2020

Question 1

A. Classify the following numbers into rational and irrationals.   (2 Marks)

$$\left\{ (1.\overline{5})^2 , \ \frac{3.14}{6} , \ \sin \pi , \ \sqrt[7]{2^7} , \ \sqrt{\sqrt{9}+6} , \ \frac{2}{3\pi} , \ \frac{22}{7} , \ \sqrt{\frac{16}{64}} \right\}$$

B. Solve the following inequalities and write the solution in interval notation.   (6x2 + 3=15) Marks

1. $3x + 5 \geq x + 1$ **2.** $x^2 + x - 6 \leq 0$

3. $\dfrac{2|x+1| - 3}{-3} < 1$ **4.** $5|3x+1| - 8 > 2 + 3|3x+1|$

5. $\dfrac{3x - 6}{x^2 - 3x - 18} < 0$ **6.** $|2x - 5| - |3x - 2| < 0$

7. **If** $f(x) = 1 - x - x^2$ **and** $g(x) = 3 - x$ **, then Solve**
$$(f \circ g)(x) + x < 1$$

Find the domain of the following functions   (6x3=18 Marks)

1. $f(x) = 2x^3 + 5x - 3$

2. $f(x) = \sqrt{\dfrac{x}{x+5}}$

3. $f(x) = \dfrac{\left|2 - x\right| + 1}{x^2 - 3x - 18}$

4. $f(x) = \sqrt[3]{\dfrac{2x + 2}{x + 4}}$

5. $f(x) = \dfrac{5}{\sec(3x)}$

6. $f(x) = \sqrt{\left|x + 2\right|}$

Question 3

Determine whether the functions   (3 Marks)

$$f(x) = 1 - \cos^2 x \text{, and } g(x) = \frac{\sin x}{\csc x}$$

are the same or not.

Question 4

Let $f(x) = \dfrac{x-1}{x+2}$.

(2x4=8 Marks)

1. Find D_f.

2. Show that f is one-to-one.

3. Find f^{-1}.

4. Find the range of f.

Let $f(x) = \dfrac{2}{x-1}, \quad g(x) = x+1$. **(3x2=6 Marks)**

1. Find $f \cdot g$ and its domain.

2. Find $\dfrac{f}{g}$ and its domain.

3. Find $(f \circ g)(3)$ and $(g \circ f)(5)$.

Find the exact value of the following: (4x2=8) Marks

1. $\cos(330°)$

2. $\cos(15°)$

3. $\sin\left(2\cos^{-1}\left(\dfrac{3}{5}\right)\right).$

4. $\sin\left(\tan^{-1}\left(-\sqrt{3}\right) + \cos^{-1}\left(\dfrac{5}{13}\right)\right).$

Question 7

Solve the equation (4 Marks)

$$(\sin x + 2)^2 = 1 \ , \quad x \in [0, 2\pi]$$

Question 8

Verify each of the following: (3x2=6) Marks

1) $2\sin^2(2x) + \cos(4x) = 1$

2) $\dfrac{\cot^2 x}{\csc^2 x} + \sin^2 x = 1$

3) $\dfrac{1}{1 - \sin x} + \dfrac{1}{1 + \sin x} = 2\sec^2 x$