KING SAUD UNIVERSITY

DEANSHIP OF COMMON FIRST YEAR COMMON

BASIC SCIENCES DEPARTMENT

MATH 101 HW # 1 / FIRST SEMESTER 1441 Date: 19/09/2019

Question 1

(2 marks for each)

A. Classify the following numbers into rational or irrational

$$\left\{\sqrt[3]{27},\ \frac{\sqrt{8}}{\sqrt{2}},\ \sqrt{9}\cdot\pi,\ \sqrt{\sqrt{25}+\sqrt{16}},\ 7.\overline{5},\ \sqrt[3]{2},\ 4.952+\frac{1}{3},\ 2.45971\ldots\right\}$$

B. Solve the following inequalities and write the solution in interval notation

1. $4x-2\leq 3$
2. $5-(2x-4)\leq \dfrac{6x+1}{3}$
3. $\sqrt{\left(\dfrac{2x-1}{3}\right)^2}+4\leq 5$
4. $\dfrac{1}{|x-1|}<\dfrac{1}{|x-2|}$
5. $\dfrac{(x^2-2x+1)\cdot x}{x^2+4x+4}\geq 0$
6. $\big||x|-1\big|\geq 3$

Question 2

A- Find the domain of the following functions

1. $f(x) = 9 - (x-1)^2$
2. $f(x) = \dfrac{1}{2 + \cos x}$
3. $f(x) = \dfrac{x+1}{1 - \sqrt{1-2x}}$
4. $f(x) = \sqrt{1 + |x|} + \sqrt[3]{x^2 - 4}$

B- Determine whether the functions

$$f(x) = \sqrt{\frac{x-1}{3-x}},\ g(x) = \frac{\sqrt{x-1}}{\sqrt{3-x}}$$

are the same or not.

Question 3

Let $f(x) = \dfrac{x+4}{x-5}$.

1. Find D_f.
2. Show that f is one-to-one.
3. Find f^{-1}.
4. Find the range of f.

Question 5

Let $f(x) = \sqrt{x^2 - 1}, \quad g(x) = \dfrac{1}{x-2}$.

1. Find $(f \cdot g)(x)$ and its domain.
2. Find $\left(\frac{f}{g}\right)(x)$ and its domain.
3. Find $(f \circ g)(x)$ and $(g \circ f)(x)$.

Question 6

A. Let ϕ be an angle in standard position, its arc length 110 cm, and the diameter of the circle is 40 cm. Determine the angle in ϕ degree, if the rotation is clockwise.

B. Use reference angles to find the exact value of the following:

1. $\cos(210^\circ)$

2. $\sin(\frac{-3\pi}{4})$

Question 7

Find the exact value of the following, without using calculator:

1. $\sin^{-1}(\sin(\frac{5\pi}{4}))$.
2. $\cos(\sin^{-1}(\frac{2}{3}) + \tan^{-1}(\frac{-1}{3}))$

Question 8

Solve the trigonometric equation

$$\cos(2x) = \sin x, \quad x \in [0, 4\pi]$$