KING SAUD UNIVERSITY
DEANSHIP OF COMMON FIRST YEAR
BASIC SCIENCES DEPARTMENT

MATH 101 **HW # 1 / FIRST SEMESTER 1443** **Date: 30/09/2021**

Question 1

(2 + 12) Marks

A. Classify the following numbers into rational or irrationals.

$$\left\{2.4\ , 3.14, \sqrt[3]{\frac{27}{125}},\ \sqrt[3]{\sqrt{25}+\sqrt{16}},\ 7.\overline{5},\ \sin\left(\tfrac{\pi}{6}\right),\ \frac{1}{3},\ 2.45971\ldots\right\}$$

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

1. $3+4(3x-2) \le 3x+4$

2. $2x-1 < x^2$

3. $\sqrt{(x-2)^2} \le 4$

4. $\dfrac{1}{|x-2|} < \dfrac{1}{5}$

5. $\dfrac{x(x^2+10x+25)}{x^2+4x+4} \ge 0$

6. $\dfrac{1}{x+2} > \dfrac{1}{x-6}$

Question 2 **14 Marks**

Find the domain of the following functions

1. $f(x) = x^3 + 4x + 1$

2. $f(x) = \dfrac{x^2 - 9}{x - 3}$

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

4. $f(x) = \sqrt[3]{\sin x}$

5. $f(x) = x^2 + \sqrt{x+1}$

6. $f(x) = x\cos x$

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

Question 3 **2 Marks**

Determine whether the functions

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

are the same or not.

Question 4 **(2+2+1) Marks**

Let $f(x) = \dfrac{3}{2x-3}$.

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

Question 5

(1+2) Marks

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

1. Find $g \circ f$.
2. Domain of $g \circ f$

Question 6 **8 Marks**

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

1. $\cos(150^\circ)$
2. $\sin 17^\circ \cos 28^\circ + \cos 17^\circ \sin 28^\circ$
3. $\cos(2\sin^{-1}(\frac{2}{3}))$
4. $\cos(\tan^{-1}(-1) + \cos^{-1}(\frac{2}{5}))$

Question 7

4 Marks

A- If $\frac{\pi}{2} < x < \pi$ and $\sin x = \frac{3}{5}$, then find

1- $\sin(2x)$

2- $\cos(2x)$

B- Verify the following identities

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

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