Answer

King Saud University Math 218– First quiz–Sem I (2021) Time: 30 min

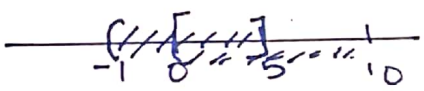
Name:..... ID:.....

Calculators are not allowed

Question	1	2	3	4	5	6	7	8
Answer	B	C	A	B	A	C	A	B

$8 \times 0.5 = 4$ pts

I) Choose the correct answer (write it in the table above):



1) $(-1, 5] \cap [0, 10) =$ $[0, 5]$

(a) $(-1, 10)$	(b) $[0, 5]$	(c) $(-1, 0] \cup [5, 10)$	(d) $[5, 10)$

2) $\dfrac{(x^{-1}y)^{-4}}{x^3y^{-4}} = \dfrac{x^4 y^{-4}}{x^3 y^{-4}} = x$

(a) xy^{-8}	(b) $x^{-1}y^{-8}$	(c) x	(d) y

3) The domain of $\dfrac{1}{\sqrt{x+3}}$ is $(-3, \infty)$

(a) $(-3, \infty)$	(b) $[-3, \infty)$	(c) $(-\infty, -3) \cup (-3, \infty)$	(d) $\mathbb{R}$

4) $\dfrac{1 + \dfrac{1}{x(x+2)}}{\dfrac{x+1}{x+2}}$ equals $\dfrac{[x(x+2)+1][x+2]}{x(x+1)(x+2)} = \dfrac{x^2+2x+1}{x(x+1)} = \dfrac{(x+1)^2}{x(x+1)} = \dfrac{x+1}{x}$

(a) $\dfrac{x}{x+1}$	(b) $\dfrac{x+1}{x}$	(c) 1	(d) x

5) The equation of the line passing through the point $A(1,2)$ and parallel to the line $y - x = 0$ is $y = x+1$

(a) $y = x + 1$	(b) $y = -x + 1$	(c) $x + y - 3 = 0$	(d) $y = -x - 1$

6) The center of the circle with equation $(x+1)^2 + (y-2)^2 = 9$ is the point $C(-1,2)$

(a) $C(1,-2)$	(b) $C(0,0)$	(c) $C(-1,2)$	(d) $C(-1,-2)$

7) If $z_1 = 2 + i$ and $z_2 = 4 - 2i$, then $z_1 z_2$ equals 10

(a) 10	(b) 6	(c) $6 - 8i$	(d) $8 + 2i$

8) The solution of equation $8 - 2x = -7(x+1)$ is $x = -3$

(a) $x = 3$	(b) $x = -3$	(c) $x = 1$	(d) $x = -1$

II) A) Find all the solutions (real or complex) of the equations:

(i) $x^2 - 6x + 13 = 0$.

$a = 1 \; ; \; b = -6 \; ; \; c = 13$

Discriminant $\Delta = b^2 - 4ac = 36 - 4\times 13 = -16 = (4i)^2$

(1)

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a} = 3 - 2i$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a} = 3 + 2i$$

(ii) $\dfrac{x+5}{x-2} = \dfrac{5}{x+2} + \dfrac{28}{x^2-4}$.

$D_E = \mathbb{R} \setminus \{\mp 2\}$

let $x \in D_E$, $\dfrac{(x+5)(x+2)}{(x-2)(x+2)} = \dfrac{5(x-2)+28}{x^2-4}$

$(x+5)(x+2) = 5x - 10 + 28 = 5x + 18$

(2)

$x^2 + 7x + 10 = 5x + 18$

$x^2 + 2x - 8 = 0$

$(x-2)(x+4) = 0$ so $x = 2 \notin D_E$ and $x = -4$

unique solution $\boxed{x = -4 \in D_E}$

B) Solve the inequality $\dfrac{(x+2)(x-1)}{x-3} \geq 0$.

let $x \neq 3$

(2)

x	$-\infty$		-2		1		3		$+\infty$
$x+2$		$-$	0	$+$	$\vert$	$+$	$\vert$	$+$	
$x-1$		$-$	$\vert$	$-$	0	$+$	$\vert$	$+$	
$x-3$		$-$	$\vert$	$-$	$\vert$	$-$	$\vert$	$+$	
$\dfrac{(x+2)(x-1)}{x-3}$		$-$	0	$+$	0	$-$	$\vert\vert$	$+$	

We deduce that $\dfrac{(x+2)(x-1)}{(x-3)} \geq 0$ iff $x \in [-2, 1] \cup (3, +\infty)$

C) Find the coordinates of the center and the radius of the circle with equation

$$x^2 + y^2 + 2x - 4y - 4 = 0.$$

(1)

$x^2 + 2x + y^2 - 4y - 4 = 0$

$(x+1)^2 - 1 + (y-2)^2 - 4 - 4 = 0$

$\boxed{(x+1)^2 + (y-2)^2 = 3^2}$ eq of a circle centred at $C(-1, 2)$ and radius $r = 3$.