

نام و نام خانوادگی: هجری شمسی: پاسخنامه تشریحی تکلیف شماره ۶ کلاس: درم:
 صبح ۱۵

الف) $y = \frac{x+4}{x^3 - 20x^2 + 31x - 15}$ $(x+4)(x-3)(x-5)(x-1)$
 $x^3 - 20x^2 + 31x - 15 = 1$
 $x^3 - 20x^2 + 31x - 16 = 0$
 $x^3 - 20x^2 + 31x - 16 = (x-1)(x^2 - 19x + 16)$
 $x^2 - 19x + 16 = 0$
 $x = \frac{19 \pm \sqrt{361 - 64}}{2} = \frac{19 \pm \sqrt{305}}{2}$
 $DF = \mathbb{R} - \left\{ \frac{19 + \sqrt{305}}{2}, \frac{19 - \sqrt{305}}{2}, 1 \right\}$

ب) $y = \frac{x+3}{x^3 - x^2 - 11x - 4}$ $(x+1)(x+2)(x-4)$
 $x^3 - x^2 - 11x - 4 = 0$
 $x^3 - x^2 - 11x - 4 = (x+1)(x^2 - 2x - 4)$
 $x^2 - 2x - 4 = 0$
 $x = \frac{2 \pm \sqrt{4 + 16}}{2} = \frac{2 \pm \sqrt{20}}{2} = 1 \pm \sqrt{5}$
 $DF = \mathbb{R} - \left\{ -1, 1 + \sqrt{5}, 1 - \sqrt{5} \right\}$

الف) $y = \frac{x+1}{x - \sqrt{3x-2}}$ $DF = (-\infty, \frac{3}{4}] - \{+1\}$
 $\sqrt{3x-2} \geq 0 \Rightarrow 3x-2 \geq 0 \Rightarrow x \geq \frac{2}{3}$
 $x - \sqrt{3x-2} \neq 0 \Rightarrow x^2 - 3x + 2 \neq 0 \Rightarrow (x-2)(x-1) \neq 0 \Rightarrow x \neq \{1, 2\}$

ب) $y = \frac{x+1}{x - \sqrt{3-2x}}$ $DF = (-\infty, \frac{3}{4}] - \{+1\}$
 $\sqrt{3-2x} \geq 0 \Rightarrow 3-2x \geq 0 \Rightarrow x \leq \frac{3}{2}$
 $x - \sqrt{3-2x} \neq 0 \Rightarrow x^2 - 3 + 2x \neq 0 \Rightarrow (x+3)(x-1) \neq 0 \Rightarrow x \neq \{-3, 1\}$

الف) $y = \frac{\cos x + 1}{2 \sin x + 1}$ $2 \sin x + 1 \neq 0 \Rightarrow \sin x \neq -\frac{1}{2}$
 $\sin x \neq -\frac{1}{2} \Rightarrow x \neq \frac{7\pi}{6}, \frac{11\pi}{6}$
 $DF = \mathbb{R} - \left\{ 2k\pi + \frac{7\pi}{6}, 2k\pi + \frac{11\pi}{6} \right\}$

ب) $y = \frac{\sin x}{2 \cos x - 1}$ $2 \cos x - 1 \neq 0 \Rightarrow \cos x \neq \frac{1}{2}$
 $\cos x \neq \frac{1}{2} \Rightarrow x \neq \frac{\pi}{3}, \frac{5\pi}{3}$
 $DF = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{3}, 2k\pi + \frac{5\pi}{3} \right\}$

الف) $y = \frac{\sin x + 1}{2 \sin^2 x - 3}$ $2 \sin^2 x - 3 \neq 0 \Rightarrow \sin^2 x \neq \frac{3}{2}$
 $\sin^2 x \neq \frac{3}{2} \Rightarrow \sin x \neq \pm \sqrt{\frac{3}{2}}$
 $DF = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{4}, 2k\pi + \frac{3\pi}{4}, 2k\pi + \frac{5\pi}{4}, 2k\pi + \frac{7\pi}{4} \right\}$

ب) $y = \frac{\tan x + 2}{\cot x - 1}$ $\cot x - 1 \neq 0 \Rightarrow \cot x \neq 1$
 $\cot x \neq 1 \Rightarrow \tan x \neq 1 \Rightarrow x \neq \frac{\pi}{4}, \frac{5\pi}{4}$
 $DF = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{4}, 2k\pi + \frac{5\pi}{4} \right\}$

الف) $y = \frac{x^2 - 4x + 5}{x^2 - 4x + 5} < 0 \Rightarrow (x-1)(x-5) < 0$
 $DF = (1, 5)$

ب) $y = \frac{x^2 - 4x + 5}{x^2 - 4x + 5} > 0 \Rightarrow (x-1)(x-5) > 0$
 $DF = (-\infty, 1) \cup (5, +\infty)$

الف) $y = \frac{x^2 - 7x + 4}{x^2 - 7x + 4} < 0 \Rightarrow (x-1)(x-4) < 0$
 $DF = [1, 4]$

ب) $y = \frac{x^2 - 7x + 4}{x^2 - 7x + 4} > 0 \Rightarrow (x-1)(x-4) > 0$
 $DF = (-\infty, -1) \cup (-1, +\infty)$

الف) $y = \frac{x^2 - 1}{x^2 - 4x + 5} > 0 \Rightarrow \frac{(x-1)(x+1)}{(x-1)(x-5)} > 0$
 $DF = (-\infty, -1] \cup (5, +\infty)$

ب) $y = \frac{x^2 - 3x + 2}{x - 5} < 0 \Rightarrow \frac{(x-2)(x-1)}{(x-5)} < 0$
 $DF = (-\infty, 1) \cup (2, 5)$

الف) $y = \sqrt{\frac{x^2 - 4x + 3}{x^3 - 1}}$ $DF = [3, +\infty)$ 5

ب) $y = \sqrt{\frac{x^2 - 4x + 3}{x^3 - 1}}$ متقی و مثبت و صفری تواند باشد چون فوق صراحت و خارج نباید صفر باشد.

$x^2 - 1 \neq 0 \Rightarrow x^2 \neq 1 \Rightarrow x \neq \pm 1$

$DF = \mathbb{R} - \{-1, +1\}$

6

$\frac{x^2 - 4x + 3}{x^3 - 1} \geq 0 \Rightarrow \frac{(x-1)(x-3)}{x^3 - 1} \geq 0$

$\frac{-}{+} \frac{-}{-} \frac{+}{+}$

تقریب نشود.

الف) $y = \log(14 - x^2) \rightarrow 14 - x^2 > 0 \Rightarrow x^2 < 14 \Rightarrow -\sqrt{14} < x < \sqrt{14}$ 5

ب) $y = \log(x^2 - 3x) \rightarrow x^2 - 3x > 0 \Rightarrow x(x-3) > 0 \Rightarrow DF = (-\infty, 0) \cup (3, +\infty)$

$|x| - 2 \neq 1 \Rightarrow |x| \neq 3 \Rightarrow x \neq \pm 3$

$|x| - 2 > 0 \Rightarrow |x| > 2 \Rightarrow x > 2 \text{ or } x < -2$

$DF = (-\infty, -2) \cup (2, +\infty) - \{\pm 3\}$

7

$\frac{x^2 - 3x}{x^3 - 1} \geq 0$

$\frac{+}{+} \frac{-}{-} \frac{+}{+}$

الف) $y = \sqrt{x^2 - 11x + 21} + \log \sqrt{34 - x^2} \rightarrow \sqrt{34 - x^2} > 0 \Rightarrow 34 - x^2 > 0 \Rightarrow x^2 < 34 \Rightarrow -\sqrt{34} < x < \sqrt{34}$ 5

ب) $y = \log \frac{x^2 - 7x + 12}{10 - x} \rightarrow \frac{x^2 - 7x + 12}{10 - x} > 0 \Rightarrow \frac{(x-3)(x-4)}{10-x} > 0$

$\frac{-}{+} \frac{-}{-} \frac{+}{+}$

$DF = (0, 4) - \{3\}$

8

$\frac{x^2 - 11x + 21}{x^3 - 1} \geq 0$

$\frac{+}{+} \frac{-}{-} \frac{+}{+}$

الف) $y = \frac{x^2 - x}{x^2 + x} = \frac{x(x-1)}{x(x+1)}$ 5

ب) $y = \frac{x^2 - x}{x^2 + x} \rightarrow \frac{x(x-1)}{x(x+1)}$

$\frac{-}{+} \frac{+}{-} \frac{+}{+}$

تقریب نشود.

	-1	0	+1
$x^2 - x$	+	0	+
$x^2 + x$	+	0	+
$P(x)$	+	0	+

الف) $y = \sqrt{\frac{x - f(x)}{f(x)}}$ 5

ب) $y = \sqrt{\frac{x - f(x)}{f(x)}}$

$\frac{x - f(x)}{f(x)} \geq 0$

$f(x) \neq 0 \Rightarrow \begin{cases} f(x) = 0 \rightarrow x = 2 \\ f(x) = 0 \rightarrow x = 4 \end{cases}$

$x - f(x) = 0 \rightarrow x = f(x) \rightarrow x = 3, -1$

$DF = (-2, -1] \cup (2, 3)$

	-2	-1	2	3
$x - f(x)$	+	+	-	+
$f(x)$	-	+	+	-
$P(x)$	-	+	+	-

