Ultimate kcet crash course 2026

maths

Domain and Range

DPP: 1

Q1 Domain of $\sqrt{x^2-25}$ is

(A) $(-\infty,\ -5]\cup[5,\infty)$

(B) [–5, 5]

(C) $(-\infty,\ -5)\cup(5,\infty)$

(D) $[0,5]$

Q2 The domain of the function $f(x)=\frac{1}{\log_{10}(1-x)}+\sqrt{x+2}$ is

(A) [-2, 0)   (0, 1)

(B) [-2, 0)

(C) [-2, 1)

(D) [-2, 0)   (0, 1)

Q3 Find the range of f(x) = $\frac{x^2-9}{x-3}$

(A) R

(B) R - {6}

(C) [0, ∞)

(D) $(-\infty,\ 0]$

Q4 The domain of the function $f(x)=\sqrt{x-1}+\sqrt{6-x}$ is

(A) $[1,\infty)$

(B) $(-\infty,6)$

(C) [1, 6]

(D) $(-\infty,6]$

Q5 Find the domain and range of $f(x)=\frac{x^2}{1+x^2}$

(A) Domain = R, Range = [0, 1)

(B) Domain = [0, 1), Range = R

(C) Domain = R, Range = R

(D) None of these

Q6 Find the domain of function $\frac{1}{\sqrt{4-3x-x^2}}$

(A) [-4, 0]   (B) [0, 1]

(C) [-4, 1]   (D) (-4, 1)

Q7 If *f*(*x*) = 4*x* – *x*², *x*   *R,* then *f*(*a* + 1) – *f*(*a* – 1) is equal to

(A) 2(4 – a)   (B) 4(2 – a)

(C) 4(2 + a)   (D) 2(4 + a)

Q8 Range of $f(x)=\frac{x^2+34x-71}{x^2+2x-7}$ is

(A) [5,9]

(B) (-∞,5]   [9,∞)

(C) (5,9)

(D) None of these

Q9 Find the domain and range of real function *f* defined by $f(x)=\sqrt{x-2}$

(A) Domain = [2, ∞), Range = [0, ∞)

(B) Domain = (2, ∞), Range = (0, ∞)

(C) Domain = [2, ∞), Range = (0, ∞)

(D) Domain = (2, ∞), Range = [0, ∞)

Q10 The domain of the function f given by $f(x)=\frac{x^2+2x+1}{x^2-x-6}$ is

(A) R – {3, -2}

(B) R – {-3, 2}

(C) R – [-2, 3]

(D) R – (-2, 3}

Q11 Find the domain of function $\sqrt{x^2-5}$

(A) $\left(-\infty,\ -\sqrt{5}\right)\cup\left(\sqrt{5},\ \infty\right)$

(B) $\left(-\infty,\ -\sqrt{5}\right]\cup\left[\sqrt{5},\ \infty\right)$

(C) $\left(-\infty,\ -5\right)\cup\left(5,\ \infty\right)$

(D) $\left(-\infty,\ -5\right]\cup\left(5,\ \infty\right)$

Q12 What is the domain of the real valued function $f(x)=\frac{1}{3x-2}$?

(A) R

(B) R – {2/3}

(C) R – {0}

(D) None of these

Q13 For real values of x, the range of $\frac{x^2+2x+1}{x^2+2x-1}$ is

(A) $(-\infty,\ 0] \cup (1,\ \infty)$

(B) [1/2, 2]

(C) $\left(-\infty,\ \frac{-2}{9}\right] \cup (1,\ \infty)$

(D) $(-\infty,\ -6] \cup (-2, \infty)$

Q14 Find the domain of the function $f(x)=\sqrt{[x]-x}$, where [.] denotes greatest integer function.

(A) 0 (B) {0,1}

(C) R (D) Z

Q15 Domain of definition of the function $f(x)=\log_{10}(x^3-x)$, is

(A) (-1,0) (1, 2)

(B) (1, 2) (2, ∞)

(C) (-1, 0) (1,∞)

(D) (1, 2)

Q16 Range of $f(x)=\frac{x^2+34x-71}{x^2+2x-7}$ is

(A) [5,9]

(B) (-∞,5] [9,∞)

(C) (5,9)

(D) None of these

Q17 Given that $y=\frac{2x}{x^2+1}$, x R, the complete set of values of y is given by

(A) {y : -1 ≤ y ≤ 1}

(B) {y : -1 < y < 1}

(C) {y : y < -1} {y : y > 1}

(D) {y : y < 1}

Q18 Write the domain and range of e^x.

(A) R, (0, ∞)

(B) $R,\ (-\infty,\ 0)$

(C) $R,\ (-\infty,\ \infty)$

(D) None of these

Q19 The domain of the function $f(x)=\sqrt{(2-2x-x^2)}$ is

(A) $-1 \le x \le \sqrt{3}$

(B) $-1-\sqrt{3} \le x \le -1+\sqrt{3}$

(C) $-2 \le x \le 2$

(D) $-1-\sqrt{3} \le x \le 1+\sqrt{3}$

Q20 Find the domain and range of the function f defined by $f(x)=\frac{x+5}{|x+5|}$

(A) D_f = R – {5}, R_f = {1}

(B) D_f = R – {-5}, R_f = {-1, 1}

(C) D_f = R, R_f = R

(D) None of these

Q21 The range of the function f(x) = |x - 1| is

(A) (-∞, 0)

(B) [0, ∞)

(C) (0, ∞)

(D) $(-\infty,\ \infty)$

Q22 If *f* : [2, 3] *R* is defined by *f*(*x*) = x^3 + 3*x* – 2, then the range *f*(*x*) is contained in the interval.

(A) [1, 12] (B) [12, 34]

(C) [35, 30] (D) [-12, 12]

Q23 Find the domain of function $\frac{1}{\sqrt{x^2-x}}$

(A) (-∞, 0) (1, ∞)

(B) (-∞, 0] [1, ∞)

(C) (1, ∞)

(D) [1, ∞)

Q24 Domain of definition of the function $f(x)=\log_{10}\left(x^3-x\right)$, is

(A) (-1,0) (1, 2)

(B) (1, 2) (2, ∞)

(C) (-1, 0) (1,∞)

(D) (1, 2)

Q25 The range of the function f(x) = $3x^2 + 7x + 10$ is

(A) [10, ∞)

(B) $\left[\frac{71}{12},\ \infty\right)$

(C) [1, ∞)

(D) None of these

Q26 Find the domain of function $\frac{1}{\sqrt{5x-3-2x^2}}$

(A) $\left(-\infty,\ 1\right)\cup\left(\frac{3}{2},\ \infty\right)$

(B) $\left(-\infty,\ 1\right]\cup\left[\frac{3}{2},\ \infty\right)$

(C) $\left(1,\ \frac{3}{2}\right)$

(D) $\left[1,\ \frac{3}{2}\right]$

Q27 The range of the function $f(x)=\frac{x^2+x+2}{x^2+x+1}$;

(A) $\left(1,\ \infty\right)$

(B) $\left(1,\ \frac{11}{7}\right]$

(C) $\left(1,\ \frac{7}{3}\right]$

(D) $\left(1,\ \frac{7}{5}\right]$

Q28 The range of the function $f(x)=\sqrt{3x^2-4x+5}$ is

(A) $\left[-\infty,\ \sqrt{\frac{11}{3}}\right]$

(B) $\left(-\infty,\ \sqrt{\frac{11}{3}}\right)$

(C) $\left[\sqrt{\frac{11}{3}},\ \infty\right)$

(D) $\left(\sqrt{\frac{11}{3}},\ \infty\right)$

Q29 Let f(x) = ||x - 1| - 1|, x ∈ [0, 2]. Range of the function is

(A) [0, 2]
(B) [0, 1]
(C) R
(D) Not defined

Q30 The domain of $f(x)=\sqrt{-x^2}$ is

(A) (0, ∞)

(B) (−∞, 0)

(C) {0}

(D) (1, ∞)

Answer Key

Q1	A
Q2	D
Q3	B
Q4	C
Q5	A
Q6	D
Q7	B
Q8	B
Q9	A
Q10	A
Q11	B
Q12	B
Q13	A
Q14	D
Q15	C
Q16	B
Q17	A
Q18	A
Q19	B
Q20	B
Q21	B
Q22	B
Q23	A
Q24	C
Q25	B
Q26	C
Q27	C
Q28	C
Q29	B
Q30	C

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

W.K.T.

$x^2 - 25 \geq 0$

$x^2 \geq 25 \Rightarrow \sqrt{x^2} \geq \sqrt{25}$

$|x| \geq 5$

$x \in (-\infty, -5] \cup [5, \infty)$

Video Solution:

Q2 Text Solution:

For domain, $x + 2 \geq 0 \Rightarrow x \geq -2$ ...(i)

$1 - x > 0 \Rightarrow x < 1$ ...(ii)

Also, $\log_{10}(1 - x) \neq 0$ ....(iii)

From (i), (ii) and (iii), we get

$x \in [-2, 0) \cup (0, 1)$

Video Solution:

Q3 Text Solution:

Let $f(x) = y$

$\therefore y = \frac{x^2-9}{x-3} \Rightarrow y = \frac{(x-3)(x+3)}{(x-3)}$

$\Rightarrow y = x + 3$

It follows from the above relation that y takes all real valme except 6 , as x≠3

Range of f=R-{6}

Video Solution:

Q4 Text Solution:

We have, $f(x) = \sqrt{x-1} + \sqrt{6-x}$

Now, $x - 1 \geq 0 \Rightarrow x \geq 1;$

$6 - x \geq 0 \Rightarrow x \leq 6$

Thus the domain is $1 \leq x \leq 6;$ i.e., $[1, 6]$

Video Solution:

Q5 Text Solution:

Here, $f(x) = \frac{x^2}{1+x^2}$

f(x) is defined for all real values of x.

∴ Domain of f(x) = R.

Let

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

$\Rightarrow \; x = \pm\sqrt{y/1-y}, \; y \neq 1$

$\because$ x is defined for $y < 1$

Clearly, $y \geq 0$

∴ Range of f(x) is [0, 1)

Video Solution:

Q6 Text Solution:

$f(x)\frac{1}{\sqrt{4-3x-x^2}}$

$4 - 3x - x^2 > 0$

$x^2 + 3x - 4 < 0$

$x^2 - x + 4x - 4 < 0$

$x(x-1) + 4(x-1) < 0$

$(x-1)(x+4) < 0$

$x > -4 \quad x < 1$

$x \in (-4, \; 1)$

Video Solution:

Q7 Text Solution:

We have, $f(x) = 4x - x^2, \; x \in R, \; f(a+1) - f(a-1)$

$= [4(a+1) - (a+1)^2] - [4(a-1) - (a-1)^2]$

$= 8 - 4a = 4(2-a)$

Video Solution:

Q8 Text Solution:

Let $\frac{x^2+34x-71}{x^2+2x-7} = y$

$\Rightarrow \quad x^2 + 34x - 71 = x^2 y + 2xy - 7y$

$\Rightarrow \quad x^2(1-y) + 2(17-y)x + (7y-71) = 0$

For real value of x, discriminant, $D \geq 0$

$\therefore 4(17-y)^2 - 4(1-y)(7y-71) \geq 0$

$\Rightarrow \; y^2 - 14y + 45 \geq 0 \Rightarrow y \geq 9, y \leq 5.$

$\therefore y \in (-\infty, 5) \cup [9, \infty)$

$\therefore$ Range of $f(x) = (-\infty, 5] \cup [9, \infty)$

Video Solution:

Q9 Text Solution:

$x-2\geq 0$

$x\geq 2$

$x\in[2,\ \infty)$

$D_f=\left[2,\ \infty\right)$

$2\leq x\leq\infty$

$0\leq f(x)\leq\infty$

$\therefore\ f(x)\in[0,\ \infty)$

$R_f=\left[0,\ \infty\right)$

Video Solution:

Q10 Text Solution:

Given, $f(x)=\frac{x^2+2x+1}{x^2-x-6}$

For domain of $f(x),\ x^2-x-6\neq 0$

$\therefore(x-3)(x+2)\neq 0\ \ \Rightarrow x\neq 3,\ -2$

$\therefore$ Domain of $f(x)$ is $R-\{3,\ -2\}$

Video Solution:

Q11 Text Solution:

$f(x)=\sqrt{x^2-5}$

$\Rightarrow\ x^2-5\geq 0$

$x^2\geq 5$

$|x|\geq\sqrt{5}$

$x\in\left(-\infty,\ -\sqrt{5}\right]\cup\left[\sqrt{5},\ \infty\right)$

Video Solution:

Q12 Text Solution:

Given, $f(x)=\frac{1}{3x-2}$

f(x) assumes real values, for all real values of x except for 3x - 2 = 0 i.e., x = 2/3

∴ Domain of f(x) = R - {2/3}

Video Solution:

Q13 Text Solution:

Let $y=\frac{x^2+2x+1}{x^2+2x-1}$

$\Rightarrow\ yx^2+2xy-y=x^2+2x+1$

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

For real values, of x, $B^2-4AC\geq 0$

$\Rightarrow 4(y-1)^2+4\left(y^2-1\right)\geq 0$

$\Rightarrow 4\left(y-1\right)\left\{\left(y-1\right)+y+1\right\}\geq 0$

$\Rightarrow 4(y-1)(2y)\geq 0\Rightarrow y\neq 1\text{and}y\leq 0,y>1$

$\therefore$ The range $=(-\infty,0]\cup(1,\infty)$

Video Solution:

Q14 Text Solution:

We have, $f(x) = \sqrt{[x] - x}$

$\therefore [x] - x \geq 0 \Rightarrow [x] \geq x$

but we know that [x] $\leq$ x $\quad \therefore [x] = x$

Hence, domain is $Z \Rightarrow x \in Z$

Video Solution:

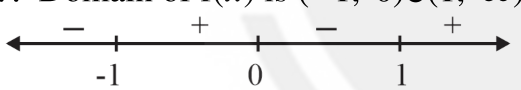
Q15 Text Solution:

Let $g(x) = \log_{10}(x^3 - x)$

$\Rightarrow x^3 - x > 0 \Rightarrow x(x+1)(x-1) > 0$

$\Rightarrow x \in (-1, 0) \cup (1, \infty)$

$\therefore$ Domain of $f(x)$ is $(-1, 0) \cup (1, \infty)$



Video Solution:

Q16 Text Solution:

Let $\frac{x^2+34x-71}{x^2+2x-7} = y$

$\Rightarrow x^2 + 34x - 71 = x^2y + 2xy - 7y$

$\Rightarrow x^2(1-y) + 2(17-y)x + (7y - 71) = 0$

For real value of x, discriminant, $D \geq 0$

$\therefore 4(17-y)^2 - 4(1-y)(7y-71) \geq 0$

$\Rightarrow y^2 - 14y + 45 \geq 0 \Rightarrow y \geq 9, y \leq 5.$

$\therefore y \in (-\infty, 5) \cup [9, \infty)$

$\therefore$ Range of $f(x) = (-\infty, 5] \cup [9, \infty)$

Video Solution:

Q17 Text Solution:

We have, $y = \frac{2x}{x^2+1} \Rightarrow x^2y - 2x + y = 0$

Since x is real, $\therefore$ Discriminant $= 4 - 4y^2 \geq 0$

$\Rightarrow 1 - y^2 \geq 0 \Rightarrow y^2 \leq 1 \Rightarrow |y| \leq 1 \Rightarrow -1 \leq y \leq 1$

Video Solution:

Q18 Text Solution:

Let f(x) = e^x

Domain of f(x) = R

Range of f(x) = (0, ∞)

Video Solution:

Q19 Text Solution:

$f(x) = \sqrt{2 - 2x - x^2}$ is defined for all x for which, $2 - 2x - x^2 \geq 0$

i.e., for which $x^2 + 2x - 2 \leq 0$. Consider $x^2 + 2x - 2 = 0$

$\Rightarrow\ x = \frac{-2\pm\sqrt{4+8}}{2}\ \Rightarrow x = -1 \pm \sqrt{3}$

Thus,

$x^2 + 2x - 2 \leq 0,\ \text{for}\ -1-\sqrt{3} \leq x \leq -1+\sqrt{3}$

$[ax^2 + bx + c \leq 0$ for $\alpha \leq x \leq \beta,$ where α and β are the roots of $ax^2 + bx + c = 0,\ \alpha < \beta]$

Video Solution:

Q20 Text Solution:

Here f(x) is not defined

if |x + 5| = 0

x + 5 = 0

x = -5

Domain = R - {-5}

Range : (1) if x > -5

$\therefore |x+5| = x+5$

$f(x) = \frac{x+5}{x+5} = 1$

Case (2) If x < -5

$|x+5| = -(x+5)$

$f(x) = \frac{x+5}{-(x+5)} = -1$

Range = {1, -1}

Video Solution:

Q21 Text Solution:

Since $|x-1| \geq 0,\ \forall x \in R$

$\therefore$ Range of $f = [0,\ \infty)$

Video Solution:

Q22 Text Solution:

Given, $f(x) = x^3 + 3x - 2,\ 2 \leq x \leq 3$

$\Rightarrow\ 8 \leq x^3 \leq 27$ and $6 \leq 3x \leq 9$

$\because$ Both x^3 and $3x$ are positive. Therefore, we have

$14 \leq x^3 + 3x \leq 36\ \Rightarrow 12 \leq x^3 + 3x - 2 \leq 34$

$\Rightarrow\ f(x) \in [12,\ 34]$

Video Solution:

Q23 Text Solution:

$x^2 - x > 0$

$x(x-1) > 0$

$x > 1$ and $x < 0$

$x \in (-\infty,\ 0) \cup (1,\ \infty)$

Video Solution:

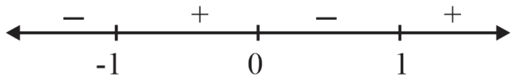
Q24 Text Solution:

Let $g(x) = \log_{10}\left(x^3 - x\right)$

$\Rightarrow\ x^3 - x > 0\ \Rightarrow x(x+1)(x-1) > 0$

$\Rightarrow\ x \in (-1,\ 0) \cup (1,\ \infty)$

$\therefore$ Domain of $f(x)$ is $(-1,\ 0) \cup (1,\ \infty)$



Video Solution:

Q25 Text Solution:

If y = f(x), then $y = 3x^2 + 7x + 10$

$\Rightarrow 3x^2 + 7x + 10 - y = 0$

Since x is real,

$\therefore\ D = b^2 - 4ac = (7)^2 - 4.3(10 - y) \geq 0$

$i.e.,\ y \geq \frac{71}{12}$

Video Solution:

Q26 Text Solution:

$f(x) = \frac{1}{\sqrt{5x-3-2x^2}}$

$5x - 3 - 2x^2 > 0$

$2x^2 - 5x + 3 < 0$

$2x^2 - 2x - 3x + 3 < 0$

$2x(x-1) - 3(x-1) < 0$

$(x-1)(2x-3) < 0$

$x > 1$ and $x < \frac{3}{2}$

$x \in \left(1,\ \frac{3}{2}\right)$

Video Solution:

Q27 Text Solution:

$x^2 + x + 1 = \left(x + 1/2\right) + \frac{3}{4} \geq \frac{3}{4} \quad \therefore x^2 + x + 1 \in \left[\frac{3}{4}, \infty\right)$

$\Rightarrow \frac{1}{x^2+x+1} \in \left(0, \frac{4}{3}\right] \Rightarrow 1 + \frac{1}{x^2+x+1} \in \left(1, \frac{7}{3}\right]$

Video Solution:

Q28 Text Solution:

f(x) is defined, if $3x^2 - 4x + 5 \geq 0$

$\Rightarrow\ 3\left[x^2 - \frac{4}{3}x + \frac{5}{3}\right] \geq 0$

$\Rightarrow 3\left[\left(x - \frac{2}{3}\right)^2 + \frac{11}{9}\right] \geq 0$

which is true for all real x

$\therefore$ Domain of f(x) = $(-\infty,\ \infty)$

$\Rightarrow y^2 = 3x^2 - 4x + 5$

$\Rightarrow 3x^2 - 4x + (5 - y^2) = 0$

For x to be real, $D \geq 0$

$\therefore 16 - 12(5 - y^2) \geq 0 \Rightarrow y \geq \sqrt{\frac{11}{3}}$

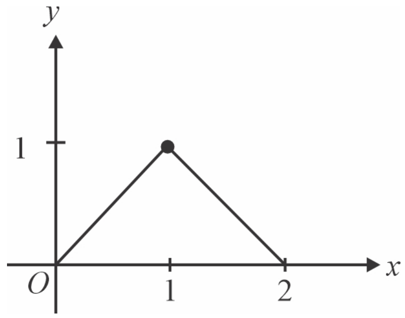
$\therefore$ Range of $y = \left[\sqrt{\frac{11}{3}}, \infty\right)$

Video Solution:

Q29 Text Solution:

If we draw the graph of the function ||x - 1| - 1| in the interval [0, 2] it will be as follows.

Therefore, range of the f(x) for [0, 2] will be [0, 1].



Video Solution:

Q30 Text Solution:

The given function $f(x) = \sqrt{-x^2}$ is defined only if x = 0

∴Domain = {0}

Video Solution: