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HOLIDAY HOME WORK-CLASS –XI-CHEMISTRY

- Write all the chemical reactions of organic chemistry.
- Complete your practical record.
- Complete your investigatory project
- Solve questionsn of organic chemistry some basic principles and techniques

Winter Break Home work.

Class: 11 th. (English)

Session year - 2025-2026

Q1. Two unseen passages. (only answer)

Q2. Two case-based passages. (only answer)

Q3. Nate-making passages. (two)(answer)

Q4. Advertisement. (10 answers)

Q5. Two posters. (only answers)

Q6. One Speech writing. (only answer)

Q7. Debate Writing (Far and Against-Both)

Q8. Reading rules of Tenses and Clauses.

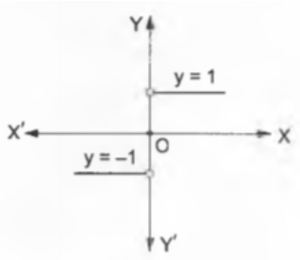
Q9. Gist writing in 80 words for Syllabus (each chapter)

Q10. Resolutions (any 10) of the year 2026.

Q11. One book review. (150 to 200 wards)

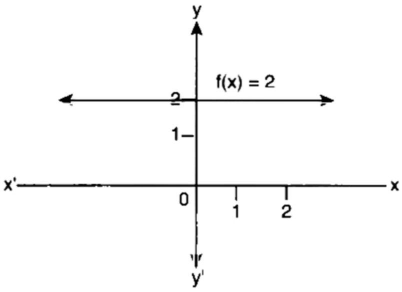
Solution
HOLIDAY HOME WORK
Class 11 - Applied Maths

1. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Given R on A = {1, 2, 3} is R = {(1, 1), (1, 2), (2, 1), (3, 2)}.
Here, domain of R = {1, 2, 3}.We note that element 1 of the domain of R has two different images 1 and 2. Therefore, R is not a function.
$\therefore$ A is true.
Also, R is true and R is the correct explanation of A.

2. 

Clearly, (0, 0) is a point on the graph. Now, when x > 0, we have |x| = x, and so in this case, we have, f(x) = 1, i.e., f(x) = 1 for all values of x >0.
And, when x < 0, we have |x| = -x
therefore, f(x) = -1 for all values of x < 0
Hence the graph may be drawn, as shown in the adjoining figure.
Clearly, the function is broken (i.e., it is discontinuous) at each of the points x = -1, 0 and 1.

3. Given, f : R $\rightarrow$ R; f(x) = 2 $\forall$ x $\in$ R



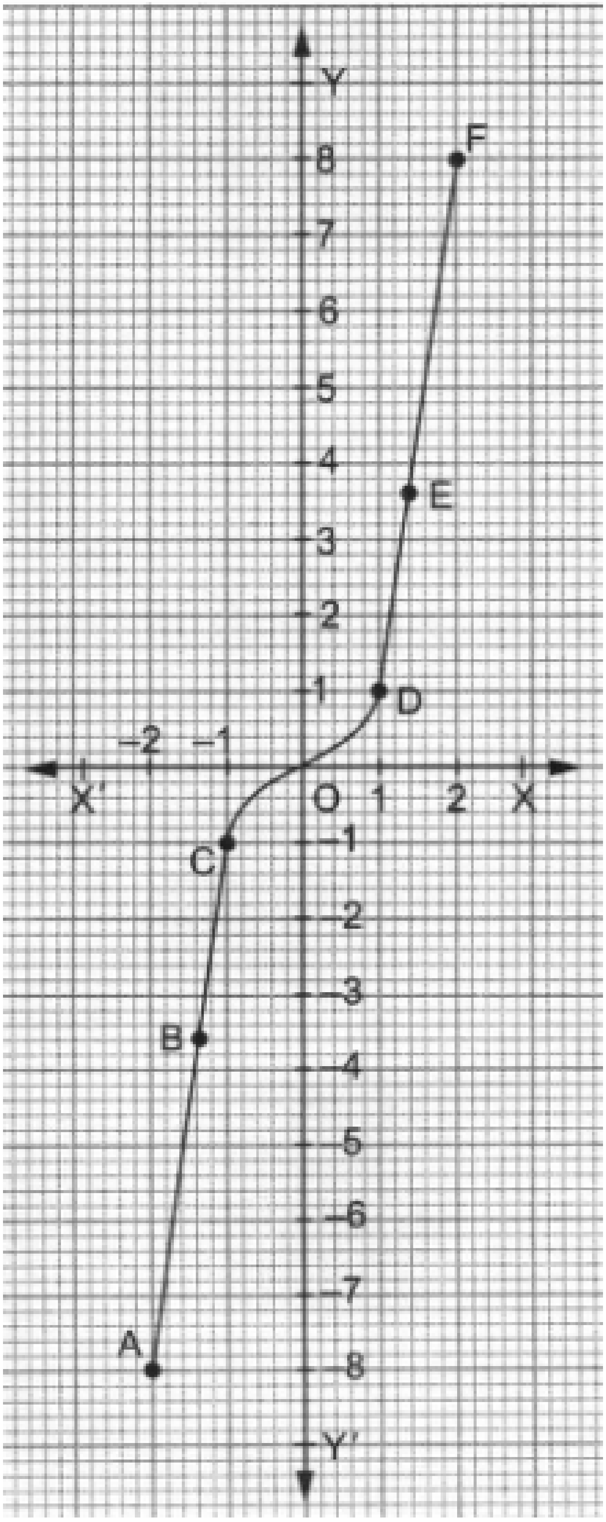
Domain = R and Range = {2}

4. We have, f :R $\rightarrow$ R: f(x) = x^3 for all x $\in$ R
dom (f) = R and range (f) = R.
We have,

x	-2	-1.5	- 1	0	1	1.5	2
f(x) = x^3	-8	-3.375	- 1	0	1	3.375	8

On a graph paper, we draw X' OX and YOY' as the x-axis and the y-axis respectively.
We take the scale as 5 small divisions = 1 unit.
Now, we plot the points A(-2, - 8), B(-1.5, -3.375), C(-1, -1), 0(0, 0), D(l, 1), E(1.5, 3.375) and F(2, 8).

We join these points freehand successively to obtain the required curve shown in the figure below.



5. i. h(x) = [x] is the greatest integer function. Its range is Z (set of integers)
   ii. f(x) = |x|. The domain of f(x) is R.
   iii. Since 10 > 0, f(10) = 1.
   OR
   g(x) is the signum function. Its range is {-1, 0, 1}.
6.
   (c) -35
   Explanation:
   -35

7. Given f(x) = $\sqrt{x+1}$, g(x) = $\sqrt{9-x^2}$
   $\Rightarrow$ D_f = [-1, ∞) and D_g = [-3, 3]

Let D = $D_f \cap D_g$ = [-1, ∞) $\cap$ [-3, 3] = [-1, 3] $\neq \phi$, then

(g - f) (x) = g(x) - f(x) = $\sqrt{9-x^2} - \sqrt{x+1}$ with domain [-1, 3]

8. i. If x = 1, y = 3(1) = 3
   If x = 2, y = 3(2) = 6
   If x = 3, y = 3(3) = 9
   $\therefore$ R = {(1, 3), (2, 6), (3, 9)}
   Thus, the give relation R is a function.

   ii. If x = 1, y > 1 + 1 or y > 2 $\Rightarrow$ y = {4, 6}
   If x = 2, y > 2 + 1 or y > 3 $\Rightarrow$ y = {4, 6}
   $\therefore$ R = {(1, 4), (1, 6), (2, 4), (2, 6)}
   Thus, the give relation R is not a function.

   iii. If x = 0, 0 + y = 3 $\Rightarrow$ y = 3
   If x = 1, 1 + y = 3 $\Rightarrow$ y = 1
   If x = 3, 3 + y = 3 $\Rightarrow$ y = 0
   $\therefore$ R = {(0, 3), (1, 2), (2, 1), (3, 0)}
   Thus, the give relation R is a function.

9. Let us find f(1), f(-1), f(0) and f(2)
   If x > 0, f(x) = 4x + 1
   By substituting x = 1 in the above equation, we get
   f(1) = 4(1) + 1
   = 4 + 1
   = 5
   If x < 0, f(x) = 3x - 2
   By substituting x = -1 in the above equation, we get
   f(-1) = 3(-1) - 2
   = - 3 - 2
   = -5
   If x = 0, f(x) = 1
   By substituting x = 0 in the above equation, we get
   f(0) = 1
   If x > 0, f(x) = 4x + 1
   By substituting x = 2 in the above equation, we get
   f(2) = 4(2) + 1
   = 8 + 1
   = 9
   Thus, f(1) = 5, f(-1) = -5, f(0) = 1 and f(2) = 9

10.

   (c) A is true but R is false.
   Explanation:
   Given n(A) = 2, n(B) =3.
   We know that number of functions from A to B = $\{n(B)]^{n(A)} = 3^2 = 9$
   $\therefore$ A is true. R is false.

11.

   (b) Domain = [1, ∞), Range = [0, ∞)
   Explanation:
   Domain = [1, ∞), Range = [0, ∞)

12. For domain,
   $x^2 - 5x + 4 \neq 0 \Rightarrow (x - 1)(x - 4) \neq 0 \Rightarrow x \neq 1, 4$
   $\therefore$ Domain = R - {1, 4}.

13. Given f(x) = log $\left(\frac{1+x}{1-x}\right)$

Now, f(x) + f(y) = log $\left(\frac{1+x}{1-x}\right)+\log\left(\frac{1+y}{1-y}\right)$

= log $\left[\left(\frac{1+x}{1-x}\right)\cdot\left(\frac{1+y}{1-y}\right)\right]$ [∵ log a + log b = log ab]

$=\log\left[\frac{1+x+y+xy}{1-x-y+xy}\right]=\log\left[\frac{(1+xy)+(x+y)}{(1+xy)-(x+y)}\right]$

= log $\left[\frac{1+\left(\frac{x+y}{1+xy}\right)}{1-\left(\frac{x+y}{1+xy}\right)}\right]$ [Dividing Nr and Dr by 1 + xy]

= f$\left(\frac{x+y}{1+xy}\right)$.

14. i. [-5, 5]

ii. R - {4}

iii. Signum function is defined as follows:

sgn(x) = $\begin{cases}\frac{|x|}{x} & ;x\equiv 0\\ 0 & ;x=0\end{cases}$

or, sgn(x) = $\begin{cases}1 & ;x>0\\ -1 & ;x<0\\ 0 & ;x=0\end{cases}$.

So it is clear that the range of the function is {-1, 0, 1}.

OR

-3

15.

(d) Z, set of integers.

Explanation:

Z, set of integers.

16. Given f(x) = 2x + 5, g(x) = x^2 + 1

i. fog = f(g (x)) = f (x^2 + 1) = 2(x^2 + 1) + 5 = 2x^2 + 7.

ii. gof = g (f (x)) = g(2x + 5) = $(2x + 5)^2$ + 1 = 4x^2 + 20x + 26.

iii. fof = f (f(x)) = f (2x + 5) = 2(2x + 5) + 5 = 4x + 15.

iv. gog = g(g(x)) = g(x^2 + 1) = $(x^2 + 1)^2$ + 1 = x^4 + 2x^2 + 2.

v. f^2 = $(f(x))^2$ = $(2x + 5)^2$ = 4x^2 + 20x + 25.

Using the results from (iii) and (v), we see that fof $\neq$ f^2.

17. (fof)(x) = f[f(x)]

$=f\left(\frac{4x+3}{6x-4}\right)$

$=\frac{4\left(\frac{4x+3}{6x-4}\right)+3}{6\left(\frac{4x+3}{6x-4}\right)-4}$

$=\frac{\left(\frac{16x+12}{6x-4}\right)+3}{\left(\frac{24x+18}{6x-4}\right)-4}$

$=\frac{\left(\frac{16x+12+3(6x-4)}{6x-4}\right)}{\left(\frac{24x+18-4(6x-4)}{6x-4}\right)}$

$=\frac{\left(\frac{16x+12+18x-12}{6x-4}\right)}{\left(\frac{24x+18-24x+16}{6x-4}\right)}=\frac{34x}{34}$

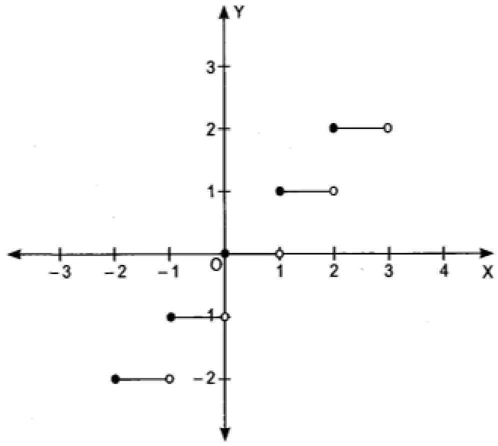
(fof)(x) = x

$\therefore f^{-1}(x)=f(x)=\frac{4x+3}{6x-4}, x\neq\frac{2}{3}$.

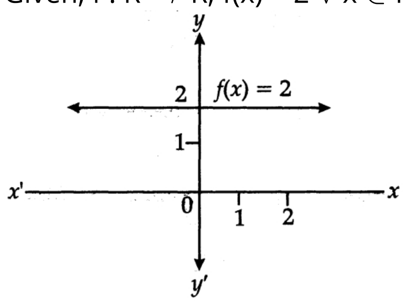
18. Given f(x) = [x], $x \in R$, [x] represents greatest integer $\leq$ x.

$$\Rightarrow f(x) = \begin{cases} \vdots & , & \vdots \\ -2 & , & -2 \leq x < -1 \\ -1 & , & -1 \leq x < 0 \\ 0 & , & 0 \leq x < 1 \\ 1 & , & 1 \leq x < 2 \\ 2 & , & 2 \leq x < 3 \\ \vdots & & \vdots \end{cases}$$

Domain = set of real numbers;
Range = set of integers



19. Given, f : R $\rightarrow$ R; f(x) = 2 $\forall$ x $\in$ R

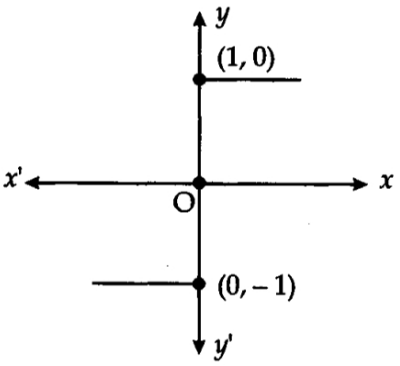


Domain = R and Range = {2}.

20. Given, f(x) = $\begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0. & x = 0 \end{cases}$

The given function is called the signum function and can be written as

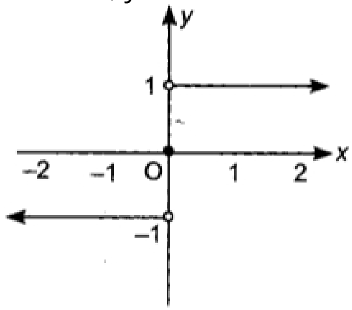
f(x) = $\begin{cases} 1, & \text{when } x > 0 \\ 0, & \text{when } x = 0 \\ -1, & \text{when } x < 0 \end{cases}$



The domain of f = R and the range of f = {-1, 0, 1}.

21. Signum function,
For x > 0, y = 1
For x = 0, y = 0

For x < 0, y = -1



22. i. From the graph, it is clear that minimum and maximum values are attained at $\frac{-\pi}{2}$ and $\frac{\pi}{2}$, respectively.
    ii. Here we can see graph is continuous between (-1, 1) and hence differentiable, as it is polynomial function.
    iii. From the given graph, it can be seen that graph increases between $-\frac{1}{2}$ and $\frac{1}{2}$.

    OR

    From the graph, we can see that Function is decreasing in $\left(-1,-\frac{1}{2}\right)$ and $\left(\frac{1}{2},1\right)$.
23. Total no. of out comes = 6^2 = 36.
    As die is thrown twice.
    E: 5 appears the die abreast once.
    E = {(1, 5)(2, 5)(3, 5)(4, 5)(5, 5)(6, 5)(5, 1)(5, 2)(5, 3)(5, 4)(5, 6)}
    F: The sum of the number on two dice is 8.
    F = {(2, 6)(3, 5)(4, 4),(5, 3)(6, 2)
    Now. P(F) = $\frac{5}{36}$
    E ∩ fF= {(3, 5)(5, 3)}
    P(E ∩ F) = $\frac{2}{36}$
    P(E | F) = $\frac{P(E\cap F)}{P(F)}$
    = $\frac{\frac{2}{36}}{\frac{5}{36}}$ = $\frac{2}{36}\times\frac{36}{5}$
    P(E | F) = $\frac{2}{5}$
24. The two balls selected can be represented as BB, BR, RB, RR, where B represents a black ball and R represents a red ball. X represents the number of black balls.
    ∴ X (BB) = 2
    X (BR) = 1
    X (RB) = 1
    X (RR) = 0
    Therefore, the possible values of X are 0, 1 and 2.
    Yes, X is a random variable.
25. S = {W1, W2, W3, W4, W5, W6, BH, BT}
    i. P(W1) = $\frac{1}{2}\cdot\frac{1}{6}$ = $\frac{1}{12}$,
    P(W2) = $\frac{1}{2}\cdot\frac{1}{6}$ = $\frac{1}{12}$,...
    P(W6) = $\frac{1}{12}$, P(BH) = $\frac{1}{2}\cdot\frac{1}{2}$ = $\frac{1}{4}$,
    P(BT) = $\frac{1}{2}\cdot\frac{1}{2}$ = $\frac{1}{4}$
    ii. P(head) = $\frac{1}{4}$
    iii. P(even number) = $\frac{1}{12}+\frac{1}{12}+\frac{1}{12}$ = $\frac{3}{12}$ = $\frac{1}{4}$
26. Given there are 6 boys and 6 girls
    ∴ No of ways in which 6 boys and 6 girls sitting together in a row = 12!
    When the girls sit together, all 6 girls can be grouped together and regarded as a single group.
    Hence we have 6 boys and 1 group of girls = 7 people
    Hence, the number of arrangements = 7!

Now, these 6 girls can be arranged among themselves = 6!
6 girls sitting arrangement = 6!
∴ Required probability = $\frac{7!\times 6!}{12!}$
= $\frac{1}{132}$

27. Given, there are two men and two women.
    Now, a committee of two persons is selected.
    $\therefore n(S)= {}^4C_2 = \frac{4\times 3}{2}=6$
    i. Let E be the event that no man is to be in the committee
       $\therefore n(E)= {}^2C_2 = 1$ [Only women will be in the committee]
       $\therefore P(E)=\frac{1}{6}$
    ii. Let E be the event that one man is in the committee
       $\therefore n(E)= {}^2C_1 \times {}^2C_1$
       $= 2\times 2 = 4$
       $\therefore P(E)= \frac{4}{6} = \frac{2}{3}$
    iii. Let E be the event that two men in the committee
       $\therefore n(E)= {}^2C_2 = 1$
       $\therefore P(E) = \frac{1}{6}$
28. A: sum of the numbers is 5 :{(1, 4),(2, 3),(3, 2),(4, 1)}
    B: at least one die shows up 3: {(1, 3), (2, 3), (3, 3), (4, 3), (5, 3), (6, 3), (3, 1), (3, 2), (3, 4), (3, 5), (3, 6)}
    i. Here A ∩ B $\neq \phi$, not mutually exclusive events.
    ii. Not exhaustive events as n(A) + n(B) $\ngeq$ n(S).
29.

    (b) A and B are mutually exclusive
    Explanation:
    If A and B are independent events, i.e., the occurrence of one does not affect the occurrence of the other, then obviously $\bar{A}$ and $\bar{B}$ are also independent of each other. Similarly, A is independent of $\bar{A}$ and $\bar{B}$ vice-versa. Again, since A and B are independent events, P($\bar{A}$ | B) = P($\bar{A}$) and similarly, P($\bar{A}$ | B) = P($\bar{A}$)
    Since P(A) + P($\bar{A}$) = 1, hence, P(A | B) + P($\bar{A}$ | B) = 1

30. For independent events,
    P(A ∩ B) = P(A)·P(B)
    i. P(A ∩ B) = P(A) · P(B) = 0.3 × 0.4 = 0.12
    ii. P(A ∩ B) = P(A) + P(B) - P(A ∩ B)
       = 0.3 + 0.4 - 0.12 = 0.58
    iii. P($\frac{A}{B}$) = $\frac{\mathrm{P(A\cap B)}}{\mathrm{P(B)}}$ = $\frac{0.12}{0.4}$ = 0.3
    iv. P($\frac{B}{A}$) = $\frac{\mathrm{P(A\cap B)}}{\mathrm{P(A)}}$ = $\frac{0.12}{0.3}$ = 0.4
31. In set of 10 coins, 2 coins are with heads on both sides. So, the remaining 8 coins are fair.
    Let E_1, E_2 and A be the events defined as follows:
    E_1 = selected coin has heads on both sides,
    E_2 = selected coin is fair and
    A = selected coin is tossed 5 times.
    ∴ P(E_1) = $\frac{2}{10} = \frac{1}{5}$ and P(E_2) = $\frac{8}{10} = \frac{4}{5}$
    P(A | E_1) = probability of a head when a two-headed coin is tossed 5 times
    = 1 . 1 . 1 . 1 . 1 = 1 and
    P(A | E_2) = probability of a head when a fair coin is tossed 5 times

= $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{32}$

We want to find P(E_1 | A) = probability when the selected coin had heads on both Sides after 5 tosses.

By Baye's theorem, we have:

P(E_1 | A) = $\frac{P(E_1)P(A|E_1)}{P(E_1)P(A|E_1)+P(E_2)P(A|E_2)}$

= $\frac{\frac{1}{5}\cdot 1}{\frac{1}{5}\cdot 1+\frac{4}{5}\cdot\frac{1}{32}} = \frac{1}{1+\frac{1}{8}} = \frac{8}{9}$

32. A: wins if she gets total of 6

and B: wins if he gets a total of 7.

A = {(1, 5), (2, 4), (3, 3), (4, 2), (5, 1)};

B = {(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)}

P(A) = $\frac{5}{36}$; P($\bar{\mathrm{A}}$) = $\frac{31}{36}$;

P(B) = $\frac{6}{36}$ = $\frac{1}{6}$; P($\bar{\mathrm{B}}$) = $\frac{5}{6}$

P(A wins in third throw) = P($\bar{\mathrm{A}}\bar{\mathrm{B}}$A)

= $\frac{31}{36} \times \frac{5}{6} \times \frac{5}{36}$ = $\frac{775}{7776}$

33. i. P(A fails alone) = P(A) - P(A ∩ B)

= 0.20 - 0.15 = 0.05

ii. $P(\bar{A}\cap\bar{B}) = P(\overline{A\cup B}) = 1 - P(A\cup B)$

P(A ∪ B) = P(A) + P(B) - P(A ∩ B)

= 0.20 + 0.30 - 0.15 = 0.35

$\therefore P(\bar{\mathrm{A}}\cap\bar{\mathrm{B}}) = 1 - 0.35 = 0.65$

iii. $P(A \mid B) = \frac{P(A\cap B)}{P(B)} = \frac{0.15}{0.30} = \frac{1}{2} = 0.50$

OR

$P(B \mid A) = \frac{P(B\cap A)}{P(A)} = \frac{0.15}{0.20} = \frac{3}{4} = 0.75$

34. $\mathop{\mathrm{Lt}}\limits_{x\to 2^-}$ f(x) = $\mathop{\mathrm{Lt}}\limits_{x\to 2^-}$ (4x - 5) = 4 × 2 - 5 = 3

$\mathop{\mathrm{Lt}}\limits_{x\to 2^+}$ f(x) = $\mathop{\mathrm{Lt}}\limits_{x\to 2^+}$ (x - k) = 2 - k

As $\mathop{\mathrm{Lt}}\limits_{x\to 2}$ f(x) exist ⇒ $\mathop{\mathrm{Lt}}\limits_{x\to 2^-}$ f(x) = $\mathop{\mathrm{Lt}}\limits_{x\to 2^+}$ f(x)

⇒ 3 = 2 - k ⇒ k = -1

35.

(d) A is false but R is true.

Explanation:

For function to be continuous at x = 1

$\mathop{Lt}\limits_{x\to 1^-} f(x) = f(1) = \mathop{Lt}\limits_{x\to 1^+} f(x)$

$\Rightarrow f(1) = \mathop{Lt}\limits_{x\to 1^+} f(x) \Rightarrow 5 = \mathop{Lt}\limits_{x\to 1^+} (2x+\lambda)$

⇒ 5 = 2 + λ ⇒ λ = 3

∴ A is false. R is true.

36.

(b) $\frac{1}{8\sqrt{3}}$

Explanation:

$\because \lim\limits_{x\to 2}\frac{\sqrt{1+\sqrt{2+x}}-\sqrt{3}}{x-2} = \lim\limits_{x\to 2}\frac{\sqrt{1+\sqrt{2+x}}-\sqrt{3}}{x-2}\times\frac{\sqrt{1+\sqrt{2+x}}+\sqrt{3}}{\sqrt{1+\sqrt{2+x}}+\sqrt{3}}$

$= \lim\limits_{x\to 2}\frac{\sqrt{2+x}-2}{(x-2)(\sqrt{1+\sqrt{2+x}}+\sqrt{3})}$

$= \lim_{x \to 2} \frac{\sqrt{2+x}-2}{(x-2)(\sqrt{1+\sqrt{2+x}}+\sqrt{3})} \times \frac{\sqrt{2+x}+2}{\sqrt{2+x}+2}$

$= \lim_{x \to 2} \frac{(x-2)}{(x-2)(\sqrt{1+\sqrt{2+x}}+\sqrt{3})(\sqrt{2+x}+2)}$

$= \lim_{x \to 2} \frac{1}{(\sqrt{1+\sqrt{2+x}}+\sqrt{3})(\sqrt{2+x}+2)}$

$= \frac{1}{(\sqrt{1+\sqrt{2+2}}+\sqrt{3})(\sqrt{2+2}+2)}$

$= \frac{1}{2\sqrt{3} \times 4}$

$= \frac{1}{8\sqrt{3}}$

37. We have to find $\lim_{x \to 2} \frac{x^2-5x+6}{x^2-4}$

When x = 2 the expression $\frac{x^2-5x+6}{x^2-4}$ assumes the indeterminate form $\frac{0}{0}$.

Therefore, (x - 2) is a common factor in numerator and denominator.

Factorising the numerator and denominator, we obtain

$\lim_{x \to 2} \frac{x^2-5x+6}{x^2-4}$ (form $\frac{0}{0}$)

= $\lim_{x \to 2} \frac{(x-2)(x-3)}{(x+2)(x-2)} = \lim_{x \to 2} \frac{x-3}{x+2} = \frac{2-3}{2+2} = -\frac{1}{4}$

38. When x $\leq$ 1, f(x) = x^2 - 1.

x 0.09 0.099 0.999 0.9999

f(x) -0.19 -0.199 -001999 -0.00019999

$\therefore \lim_{x \to 1^-}$ f(x) = 0

when x > 1 f(x) = $-x^2$ - 1

x 1.1 1.01 1.001 10001

f(x) -2.21 -2.0201 -2.002001 -2.00020001

$\therefore \lim_{x \to 1^+}$ f(x) = -2

Since $\lim_{x \to 1^-}$ f(x) $\neq \lim_{x \to 1^+}$ f(x)

$\therefore \lim_{x \to 1}$ f(x) does not exist.

39. Here f(x) = |x| - 5

L.H.L. $\lim_{x \to 5} f(x) = \lim_{x \to 5^-} |x| - 5$

Put x = 5 – h as x → 5, h → 0

$\therefore \lim_{h \to 0} |5-h| - 5 = \lim_{h \to 0} 5 - h - 5 = \lim_{h \to 0}(-h) = 0$

R.H.L. $= \lim_{x \to 5^+} f(x) = \lim_{x \to 5^+} |x| - 5$

Put x = 5 + h as x → 5, h → 0

$\therefore \lim_{h \to 0} |5+h| - 5 = \lim_{h \to 0} 5 + h - 5 = \lim_{h \to 0} h = 0$

Now L.H.L. = R.H.L

Thus limit exists at x = 5 and $\lim_{x \to 0} f(x) = 0$

40. i. Given,

$\lim_{x \to 0} \frac{\sqrt{1+x^3}-\sqrt{1-x^3}}{x^2}$

= $\lim_{x \to 0} \frac{\sqrt{1+x^2}-\sqrt{1-x^3}}{x^2} \cdot \frac{\sqrt{1+x^3}+\sqrt{1-x^3}}{\sqrt{1+x^3}+\sqrt{1-x^3}}$

= $\lim_{x \to 0} \frac{(1+x^3)-(1-x^3)}{x^2\left(\sqrt{1+x^3}+\sqrt{1-x^3}\right)}$

= $\lim\limits_{x \to 0} \frac{2x^3}{x^2\left(\sqrt{1+x^3}\right)+\sqrt{1-x^3}}$

= $\lim\limits_{x \to 0} \frac{2x}{\sqrt{1+x^3}+\sqrt{1-x^3}}$

= 0

ii. $\lim\limits_{x \to 1} \frac{x^7-2x^5+1}{x^3-3x^2+2}$

On differentiating both numerator & denomentator w.r.t x we get

$\Rightarrow \lim\limits_{x \to 1} \frac{\frac{d}{dx}\left(x^7-2x^5+1\right)}{\frac{d}{dx}\left(x^3-3x^2+2\right)}$

$\Rightarrow \lim\limits_{x \to 1} \frac{7x^6-10x^4}{3x^2-6x}$

On putting limit we get

$\Rightarrow \frac{7(1)^6-10(1)^4}{3(1)^2-6(1)}$

= $\frac{7-1}{3-6}$

= $\frac{-3}{-3}$ = 1

Hence $\lim\limits_{x \to 1} \frac{x^7-2x^5+1}{x^3-3x^2+2}$ = 1

iii. $\lim\limits_{x \to 2}\left[\frac{x^2-4}{x^3-4x^2+4x}\right]$ = $\lim\limits_{x \to 2}\left[\frac{(x-2)(x+2)}{x(x^2-4x+4)}\right]$

= $\lim\limits_{x \to 2} \frac{(x-2)(x+2)}{x(x-2)^2}$

= $\lim\limits_{x \to 2} \frac{(x+2)}{x(x-2)}$

Putting x = 2

= $\frac{2+2}{2(2-2)}$

= $\frac{4}{2(0)}$

= $\frac{4}{(0)}$

= ∞

It is not defined.

OR

$\lim\limits_{x \to -1}\left(\frac{x^{10}+x^5+1}{x-1}\right)$

= $\frac{(-1)^{10}+(-1)^2+1}{-1-1}$

= $\frac{1-1+1}{-2}$

= $-\frac{1}{2}$

41. $\lim\limits_{x \to 0} \frac{\left[(1+x)^2\right]^3-(1)^3}{(1+x)^2-1}$

$= \lim\limits_{x \to 0} \frac{\left[(1+x)^2-1\right]\left[(1+x)^4+(1+x)^2+1\right]}{(1+x)^2-1}$

$= \lim\limits_{x \to 0}\left[(1+x)^4+(1+x)^2+1\right]$

= 1 + 1 + 1 = 3

42. Here $\underset{x \to 2}{\text{Lt}} \frac{3x^2-x-10}{x^2-4}$ assumes indeterminate form $\frac{0}{0}$, so x - 2 is a factor of both numerator and denominator.

We factorize both numerator and denominator and cancel out this common factor x - 2 and then evaluate the limit.

$\therefore \underset{x \to 2}{\text{Lt}} \frac{3x^2-x-10}{x^2-4}$ = $\underset{x \to 2}{\text{Lt}} \frac{(x-2)(3x+5)}{(x-2)(x+2)}$

= $\underset{x\to 2}{\text{Lt}}\ \frac{3x+5}{x+2}$ ($\because$ x $\neq$ 2, so x - 2 can be cancelled)

= $\frac{3\times 2+5}{2+2} = \frac{11}{4}$

43. $\underset{x\to 1}{\text{Lim}}\left[\frac{x-2}{x^2-x}-\frac{1}{x^3-3x^2+2x}\right]$ = $\underset{x\to 1}{\text{Lim}}\left[\frac{x-2}{x(x-1)}-\frac{1}{x(x-1)(x-2)}\right]$

(When x = 1, the expression $\frac{x-2}{x(x-1)}-\frac{1}{x(x-1)(x-2)}$ assumes the form $\infty-\infty$.

So, we simplify the given expression to express it in the form $\frac{0}{0}$. Take LCM of denominators.)

= $\underset{x\to 1}{\text{Lim}}\ \frac{(x-2)^2-1}{x(x-1)(x-2)}$ = $\underset{x\to 1}{\text{Lim}}\ \frac{(x-2+1)(x-2-1)}{x(x-1)(x-2)}$

= $\underset{x\to 1}{\text{Lim}}\ \frac{(x-1)(x-3)}{x(x-1)(x-2)} = \underset{x\to 1}{\text{Lim}}\ \frac{x-3}{x(x-2)}$

= $\frac{1-3}{1(1-2)} = \frac{-2}{-1}$ = 2

44. i. No, as f(-1) = $\frac{(-1)^3-2(-1)+1}{-1+2}$ = $\frac{-1+2+1}{1}$ = 2

ii. Student is correct as for limit we see the behaviour is neighbourhood of '2', we are not actually taking x = 2, so x - 2 $\neq$ 0. Hence, we can divide.

iii. Second student is correct as sin 3x $\neq$ 3 sin x.

OR

False, as for continuity $\lim\limits_{x\to a^-}$ f(x) = $\lim\limits_{x\to a^+}$ f(x) = f(a)

45.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

Given $\underset{x\to 5}{Lt}\ \frac{x^n-5^n}{x-5}$ = 500, n $\in$ **N**

$\Rightarrow$ n. 5^{n-1} = 500 $\left(\because \underset{x\to a}{Lt}\ \frac{x^n-a^n}{x-a} = na^{n-1}\right)$

$\Rightarrow$ n . 5^{n-1} - 1 = 4.5^3 $\Rightarrow$ n = 4

$\therefore$ A is true.

Aslo, R is true but R is not the correct explanation of A.

46. Let y = $\frac{x}{2x+1}$

Differentiating w.r.t. x, we get

$\frac{dy}{dx}$ = $\frac{d}{dx}\left(\frac{x}{2x+1}\right)$

= $\frac{(2x+1)\frac{dx}{dx}-x\cdot\frac{d}{dx}(2x+1)}{(2x+1)^2}$

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

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

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

47. Let y = log $\left(\frac{x^2+x+1}{x^2-x+1}\right)$

Differentiating with respect to x,

$\frac{dy}{dx} = \frac{d}{dx}\left[\log\left(\frac{x^2+x+1}{x^2-x+1}\right)\right]$

$= \frac{1}{\left(\frac{x^2+x+1}{x^2-x+1}\right)} \frac{d}{dx}\left(\frac{x^2+x+1}{x^2-x+1}\right)$ [Using chain rule and quotient rule]

$= \left(\frac{x^2-x+1}{x^2+x+1}\right)\left[\frac{\left(x^2-x+1\right)\frac{d}{dx}\left(x^2+x+1\right)-\left(x^2+x+1\right)\frac{d}{dx}\left(x^2-x+1\right)}{\left(x^2-x+1\right)^2}\right]$

$= \left(\frac{x^2-x+1}{x^2+x+1}\right)\left[\frac{\left(x^2-x+1\right)(2x+1)-\left(x^2+x+1\right)(2x-1)}{\left(x^2-x+1\right)^2}\right]$

$= \frac{\left(x^2-x+1\right)}{\left(x^2+x+1\right)}\left[\frac{2x^3-2x^2+2x+x^2-x+1-2x^3-2x^2-2x+x^2+x+1}{\left(x^2-x+1\right)^2}\right]$

$= \frac{-4x^2+2x^2+2}{\left(x^2+x+1\right)\left(x^2-x+1\right)}$

$= \frac{-2\left(x^2-1\right)}{x^4+1+2x^2-x^2}$

$= \frac{-2\left(x^2-1\right)}{x^4+x^2+1}$

So,

$\frac{d}{dx}\left(\log\frac{x^2+x+1}{x^2-x+1}\right) = \frac{-2\left(x^2-1\right)}{x^4+x^2+1}$

48. Consider f(x) = $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2$

$\Rightarrow$ f(x) = x + $\frac{1}{x}+2$

$\Rightarrow$ f'(x) = $\frac{d}{dx}\left(x+\frac{1}{x}+2\right)$

= 1 - $\frac{1}{x^2}$ + 0 = 1 - $\frac{1}{x^2}$

49. i. $\frac{d}{dx}\left(\frac{1}{\sqrt{x}}\right)$ = $\frac{d}{dx}\left(x^{-1/2}\right)$

= $-\frac{1}{2}x^{-3/2}$ = $\frac{-1}{2x^{3/2}}$

ii. $\frac{d}{dx}(4x-3)^7$ = $7(4x - 3)^6\frac{d}{dx}(4x - 3)$

= $7(4x - 3)^6 \cdot 4$

= $28(4x - 3)^6$

iii. Given y = $2x^3$ - x + 4

$\Rightarrow \frac{dy}{dx}$ = $6x^2$ - 1

$\Rightarrow \left.\frac{dy}{dx}\right]_{x=3}$ = $6(3)^2$ - 1 = 54 - 1 = 53

OR

Given y = x^3

$\Rightarrow \frac{dy}{dx}$ = $3x^2$ = $3(x^3)^{2/3}$ = $3y^{2/3}$

50. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Given f (x) == $\frac{x^{100}}{100}+\frac{x^{99}}{99}+\ldots+\frac{x^2}{2}+x+1$

$\Rightarrow f'(x) = \frac{1}{100}\cdot 100x^{99}+\frac{1}{99}\cdot 99x^{98} +\ldots+\frac{1}{2}\cdot 2x+1+0$

$\Rightarrow$ f'(x) = $x^{99} + x^{98}$ + ... + x + 1

Now, f'(0) = 0 + 0 + ...+ 0 + 1 $\Rightarrow$ f'(0) = 1

and f'(1) = $1^{99} + 1^{98}$ + ... + 1 + 1 = 100

$\Rightarrow$ f'(1) = 100

So, f'(1) = 100 f'(0)

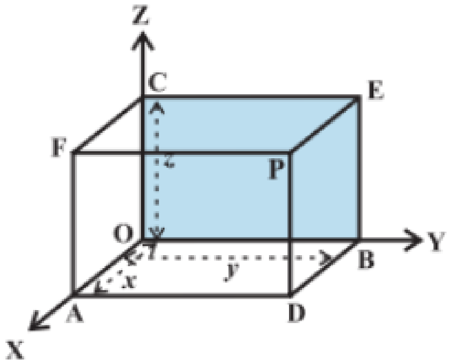
$\therefore$ A is true.

Also, R is true and R is the correct explanation of A.

PM SHRI KENDRIYA VIDYALAYA SEONI

HOLIDAY HOME WORK
Class 11 - Mathematics

1. In Fig, if P is (2, 4, 5), find the coordinates of F. **[1]**



2. Are the points A(3, 6, 9), B(10, 20, 30) and C(25, -41, 5), the vertices of a right-angled triangle? **[2]**
3. The centroid of a triangle ABC is at the point (1, 1, 1). If the coordinates of A and B are (3, –5, 7) and (–1, 7, –6), respectively, find the coordinates of the point C. **[1]**
4. Show that the points A (1, 2, 3), B(-1, -2, -1), C(2, 3, 2) and D(4, 7, 6) are the vertices of a parallelogram ABCD, but it is not a rectangle. **[3]**
5. Find the equation of set of points P such that $PA^2 + PB^2 = 2k^2$, where A and B are the points (3, 4, 5) and (-1, 3, -7), respectively. **[2]**
6. If the origin is the centroid of the triangle PQR with vertices P(2a, 2, 6), Q(-4, 3b, -10) and R(8, 14, 2c), then find the values of a, b and c. **[3]**
7. Three vertices of a parallelogram ABCD are A(3, -1, 2), B(1, 2, -4) and C(-1, 1, 2). Find the coordinates of the fourth vertex. **[3]**
8. Find the equation of the set of points which are equidistance from the points (1, 2, 3) and (3, 2, -1). **[3]**
9. Find perpendicular distance from the origin of the line joining the points $(\cos\theta, \sin\theta)$ and $(\cos\phi, \sin\phi)$. **[5]**
10. Find the image of the point (3, 8) with respect to the line x + 3y = 7 assuming the line to be a plane mirror. **[5]**
11. Find angles between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$. **[3]**
12. Reduce the equation into slope intercept form and find the slope and the y-intercept. **[3]**
    6x + 3y - 5 = 0
13. If the lines 2x + y - 3 = 0, 5x + ky - 3 = 0 and 3x - y - 2 = 0 are concurrent, find the value of k. **[1]**
14. Find the distance of the line 4x – y = 0 from the point P (4, 1) measured along the line making an angle of 135° with the positive x-axis. **[2]**
15. Assuming that straight lines work as the plane mirror for a point, find the image of the point (1, 2) in the line x – 3y + 4 = 0 **[2]**
16. A line is such that its segment between the lines 5x – y + 4 = 0 and 3x + 4y – 4 = 0 is bisected at the point (1, 5). Obtain its equation. **[2]**
17. Line through the points (-2, 6) and (4, 8) is perpendicular to the line through the points (8, 12) and **[1]**

(x, 24). Find the value of x.

18. Find the slope of the line making inclination of 60° with the positive direction of x-axis. **[1]**

19. If p and q are the length of perpendiculars from the origin to the lines **[3]**

$x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y\operatorname{co}sec\theta = k$ respectively, prove that $p^2 + 4q^2 = k^2$.

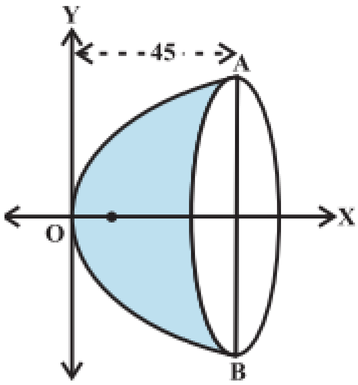
20. The perpendicular from the origin to the line y = mx + c meets it at the point (-1, 2). Find the values of m and c. **[3]**

21. The length L (in centimeter) of a copper rod is a linear function of its Celsius temperature C. In an experiment if L = 124.942 when C = 20 and L = 125.134 when C = 110, express L in terms of C. **[5]**

22. Find the centre and the radius of the circle: $x^2 + y^2 + 8x + 10y - 8 = 0$ **[1]**

23. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the latus rectum of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ **[2]**

24. The focus of a parabolic mirror as shown in is at a distance of 5 cm from its vertex. If the mirror is 45 cm deep, find the distance AB **[2]**



25. A rod AB of length 15 cm rests in between two coordinate axes in such a way that the end point A lies on x-axis and end point B lies on y-axis. A point P(x, y) is taken on the rod in such a way that AP = 6 cm. Show that the locus of P is an ellipse. **[2]**

26. Find the equation of hyperbola which has Vertices $(\pm 7, 0), e = \frac{4}{3}$ **[3]**

27. Find the equation of the circle passing through the points (2, 3) and (-1, 1) and whose centre is on the line x - 3y - 11 = 0. **[3]**

28. Find the coordinates of the foci, and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas. $5y^2 - 9x^2 = 36$ **[3]**

29. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum: $x^2 = -9y$ **[2]**

30. Find the equation of the parabola that satisfies the given conditions: Focus (6, 0) directrix x = -6 **[1]**