FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

COURSE- MAT 111

BY CLEVER-B & ANOMALOUS

1. In an examination, 18 students passed MAT111, 17 students passed PHY113, 11 students passed both subject. Find the number of students that passed MAT111 only. A: 5 B: 6 **C: 7**
2. Suppose set R={2,4,6,8,10,12,14,16,18,20}, find the number of elements in set R. A: 7 B: 9 **C: 10**
3. In an examination, 25 students passed MAT112 while 22 students passed STA117. If 15 students passed both courses and 2 students failed both courses. Find the total number of students that sat for the examination. A: 32 B: 33 **C: 34**
4. A mapping g: A→B in which all the elements of domain of g are mapped into a single element in the co-domain is called. A: Composite mapping **B: Constant mapping** C: One-one mapping
5. Given two non-empty sets A and B, if there is a rule which links that element in set A to a unique element in set B, then such a rule is called. A: Range B: Co-domain **C: Mapping**
6. A mapping f: A→A in which every element in the domain of f is the same as the element of the co-domain is called. **A: Identity mapping** B: One-one mapping C: Onto-mapping
7. Determine the domain D of the mapping f: x→2x-3, if C={-3,-1,5} is the range and f is defined on D. **A: {0,1,4}** B: {1,2,4} C: {1,3,5}
8. Let f: X→Y be a mapping. If every element of the co-domain is an image of at least one element in the domain, the mapping f is called. A: One-one mapping **B: Onto-mapping** C: Constant mapping
9. If X={2,4,6}, determine the number of power set of X denoted as n{P(X)}. A: 7 **B: 8** C: 9
10. Given set X={1,2,3} and set Y={3,1,2}, which of the following statement is true for X and Y. **A: X=Y** B: X≠Y C: X≤Y
11. Given that P={1,3,5,7} and Q={2,5,6,8,9}, determine P∪Q. A: {1,3,5,8,9} B: {1,2,4,6,9} **C: {1,2,3,5,6,7,8,9}**
12. If set F={x: (2<x≤5)∪(9<x<12)}, list the members of set F. **A: {3,4,5,10,11}** B: {3,4,5,7,11} C: {2,3,4,5,10}
13. Given that X={x: 3<x<6} and Y={x: 4≤x≤8}, find X∩Y. A: {5,6} **B: {4,5}** C: {3,7}
14. If X∩Y=Φ, then X and Y are said to be. A: Finite sets **B: Disjoint sets** C: Null sets
15. Given the universal set μ={1,2,3,4,5} and P={1,2,4}, Q={2,4,5}, find P¹ ∩ Q. A: {1} B: {2} **C: {5}**
16. If set P={even numbers} and Q={x: 7<x≤16}, list the elements of P∩Q. A: {2,6,12,16} B: {2,4,8,12} **C: {8,10,12,14,16}**
17. Let f: X→Y and g: Y→Z be mappings on the set of real numbers defined by f(x)=x+1 and g(y)=(y+1)². Find gof. **A: x²+4x+4** B: x²+2x+3 C: x²-3x+1
18. Determine the domain D of the mapping g: x→2x²-1, if R={1,7,17} is the range and g is defined on D. **A: {1,-1,2,-2,3,-3}** B: {4,-4,3,-3,5,-5} C: {1,2,3}

19. Given the universal set μ={1,2,3,4,5,6} where X={2,4,6} and Y={1,2,6}, find (X∩Y)^c. A: {1,4,5} **B: {1,3,4,5}** C: {2,4,5,6}
20. Given the universal set μ={1,2,3,4,5,6,7,8} where A={1,3,5,7}, B={1,2,5,7} and C={3,6,7,8}. List the members of A^c∩B∩C^c. A: {1} **B: {2}** C: {3}
21. which of the following best describe a set? **A: A set is any collection of objects such that given an object it is possible to determine weather that object belong to the given collection or not.** B: A set is collection of objects C: The set of all letters of the alphabet.
22. A set can be completely specified by one or combination of the following
 i. By listing all of the member of the set.
 ii. By describing the element of the set.
 iii. By enclosing within braces {} any general element with a clearly define properly. **A: I ,II and III** B: I and II only C: III only
23. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered only course ? **A: 39** B: 50 C: 47
24. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered at least one course? **A: 90** B: 39 C: 79
25. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered exactly two courses? **A: 40** B: 51 C: 11
26. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered at least two courses? **A: 51** B: 39 C: 90
27. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered Math 111? **A: 45** B: 8 C: 28
28. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered Phy 113 and Chem 111 only? **A: 14** B: 25 C: 31
29. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered Chem 111 ? **A: 57** B: 23 C: 34
30. Consider the Venn Diagram below
 v.png
 Where M,P and C represent all 100 students of F.U.T Minna who offered Math111,Phy113 and Chem111 respectively
 How many offered at least 3 courses? **A: 11** B: 39 C: 51
31. One of the following ideas best described a function. **A: A rule of correspondence beween two sets** B: Equation or formular involving variables and constants C: A rule that assigns real number to real number.
32. Which of the following best described the concept of partial fraction? **A: It involves the process of spliting a given rational algebraic fraction into sum of simpler proper fractions** B: It involves the process of spliting a given algebraic fraction into sum of simpler proper fractions C: It involves the process of spliting a given polinomia fraction into sum of simpler proper fractions
33. Express (10-2x)/((x-3)(x-1)) in partial fractions. **A: 2/(x-3)+4/(x-1)** B: 2/(x-3)-4/(x-1) C: 2/(x-1)+4/(x-3)

34. Given that (8x-28)/((x-2)(x-4))=a/(x-2)+b/(x-4) .
 Find the values of A and B. **A: a=6, b=2** B: a=2, b=6 C: a=6, b=-2
35. Express (x+7)/(x² -7x+10) in partial fractions. **A: 4/(x-5)-3/(x-2)** B: 3/(x-5)-4/(x-2) C: 4/(x-5)+3/(x-2)
36. Express (35x-14)/(7x-2)² in partial fractions. A: 4/(7x-2)² -5/(7x-2) **B: B. 5/(7x-2)-4/(7x-2)²** C: C. 5/(7x-2)+4/(7x-2)²
37. Given that (42x+44)/(6x+5)² =A/(6x+5)+B/(6x+5)² , find A and B. A: A=-7, B=-9 B: A=-7, B=9 **C: A=7, B=9**
38. If in partial fraction, (x² +3x-10)/(x² -2x+3)=1+5B/((x+1)(x-3)) , find the value of B. **A: 1** B: 7 C: -7
39. The fraction (2x³ +3x² -54x+50)/(x² +2x-24) is equivalent to. A: 2x-1+(4x-26)/((x+6)(x-4)) B: 2x-1+(26+4x)/((x+6)(x-4)) **C: 2x-1-(4x-26)/((x+6)(x-4))**
40. If 5x-7=A(x-2)+B(x-1), find the values of A and B. **A: A=3, B=2** B: A=-3, B=2 C: A=3, B=-2
41. Write 14x/(6x² -x-2) as a sum of two fractions. **A: 4/(3x-2)+2/(2x+1)** B: 4/(7x-2)-2/(2x+1) C: 4/(2x+1)-2/(3x-2)
42. Repeated factors in the denominator of the algebraic expression of the form (ax+b)² give partial fractions of the form. A: B/(ax+b)² **B: A/(ax+b)+B/(ax+b)²** C: Ax/(ax+b)+B/(ax+b)²
43. An irreducible quadratic factor in the denominator of the rational expression of the form ax² +bx+c gives rise to a partial fraction. **A: (Ax+B)/(ax² +bx+c)** B: A/(ax² +bx+c)+B/(ax+b) C: Ax/(ax+b)+B/(ax+b)²
44. The general form of the fraction 1/(ax² +bx+c)+1/(ax+b) in partial fractions where ax² +bx+c is irreducible is. **A: A/(ax² +bx+c)+B/(ax+b)** B: (Ax+B)/(ax² +bx+c)+C/(ax+b) C: A/(ax² +bx+c)+(Bx+C)/(ax+b)
45. The fraction x/(x² -b²) can be expressed in partial fraction as. A: (Ax+B)/(x² -b²) **B: 1/2(1/(x-b)-1/(x+b))** C: 1/2(1/(x-b)+1/(x+b))
46. if (6x² +17x+6)/(x(x+2)(x+3))=A/x+B/(x+2)+C/(x+3) , find the value of A+B-C. A: 1 **B: 0** C: 3
47. If (x+1)/(x² -1)+(x-2)/(x² -4)=A/(x-1)+B/(x+2), find A+B. **A: 2** B: 1 C: 3
48. If (2x+2)/(x² +3x+2)+(x+3)/(x² +x-6)=A/(x+2)+B/(x-2) , then A+B is equal to. A: 1 B: 2 **C: 3**
49. Resolve the expression (8x-6)/(x² -4x-21)into partial fractions. A: -3/(x+3)-5/(x-7) **B: 3/(x+3)+5/(x-7)** C: 5/(x+3)+3/(x-7)
50. Resolve the expression -((x+3)/(x² +x-6)) into partial fractions. **A: 1/(2-x)** B: 1/(x-2) C: -1/(x-3)
51. Resolve into partial fractions(4x-13)/((x+8)(x-7)) into its partial fractions. A: 2/(x+8)-2/(x+7) **B: 3/(x+8)+1/(x-7)** C: 3/(x-7)-1/(x+8)
52. Resolve into partial fractions 1/(x(x² -1)). **A: 1/(2(x-1))-1/(2(x+1))-1/x** B: 1/(2(x-1))+1/(2(x+1))+1/x C: 2/((x-1))+2/((x+1))+1/x
53. The third term of an AP is 6 and the seventh term is 30. Determine the common difference and the first term. **A: 6 and -6** B: -6 and 6 C: 5 and 6

54. Find the 10th term of the Geometric Progression: 1.0, 0.5, 0.25, 0.125, ---------- ------- A: 1.953125*10⁻¹ B: 1.953125*10⁻² **C: 1.953125*10⁻³**
55. Given that; 3x-2, 5x-3 and x+6 are three consecutive numbers in a GP. Determine the possible quadratic equation for the progression. A: 25x²+46x+21=0 **B: 22x²-46x+21=0** C: 22x²-46x-21=0
56. If the first term of an AP is 7/2 and the common difference is 2/3. Find the sum of the first 22nd term. A: 232 **B: 231** C: 234
57. Given that; 3x-2, 5x-3 and x+6 are three consecutive numbers in an AP. Determine the value of x for the progression. A: 3/3 B: 1/3 **C: 5/3**
58. The second term of a GP is 49 and the 4th term is 2401. Find the common ratio of the GP. A: 5 B: 6 **C: 7**
59. Given that; 5x+3, 6x-2 and 4x+1 are three consecutive numbers in a GP. Determine the quadratic equation for the progression. **A: 16x² -41x+1=0** B: 16x² +41x+1=0 C: 16x² -41x-1=0
60. If the first term of an AP is 7/3 and the 21st term is 47/2. Find the sum of the terms. A: 3255/6 **B: 3255/12** C: 3255/9
61. Given that; 5x+3, 6x-2 and 4x+1 are three consecutive numbers in an AP. Determine the value of x for the progression. A: 7/3 **B: 8/3** C: 4/3
62. The first and the fifth terms of a GP are 256 and 625 respectively. Determine it common ration. A: 1/4 **B: 5/4** C: 7/4
63. If the first term of an AP is 24 and the common difference 1/3. Find the 23rd term. A: 92/3 **B: 94/3** C: 95/3
64. Find the sum of the first 50 natural numbers; A: 1270 B: 1265 **C: 1275**
65. The sum of the arithmetic progression 4, ..., 76 is 1920. Find the number of terms. **A: 48** B: 45 C: 40
66. Find the 10th term of the progressions: 3,5,7,..... A: 15 B: 17 **C: 21**
67. Find the 15th term of the pregression: 15,9,3,..... **A: -69** B: 69 C: 59
68. The third term of an arithmetic progression is 10 and the seven term is 34. Find the first term and the common difference. **A: -2 and 6** B: -2 and -6 C: 2 and 6
69. The second term of an AP is -4 and the sixth term is -24. Determine the first term. **A: 1** B: -1 C: 5
70. The second term of an AP is -4 and the sixth term is -24. Find the common difference. **A: -5** B: 5 C: 1
71. The second term of an AP is -4 and the sixth term is -24. Find the sum of the first twenty terms of the progression if the first term is one and the common difference is minus five. **A: -930** B: 930 C: 903
72. Find the sum of the first 100 natural number: 1+2+3+4+5+.....+ n. A: 5505 **B: 5050** C: 5550
73. Find the sum to infinity of the series: 20+ 4+ 0.8 + 0.16 + 0.032 + ... **A: 25** B: 16 C: 20

$x-3)+B(x-1)$, find
d B

$-1+\frac{5x+B}{(x+1)(x-3)}$,
B.

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0}

t of the set P = {1,3}
{1,3}, {2,3}, {1,2,3}, {∅}
5, 6, 7, 8, 9}, A = {1,3,4}
nd $(A \cap C)'$.
}
S = {3, {1, 4}}
∅}

students, 40 offer
geography and 30
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students, 40 offer
geography and 30 offer
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f a school visited
school for football
udents could play

football while 20 students play volleyball. If 8 students could play both games, find the number of students that could not play any of the two games.
(Ans) 8

65) List the elements of the set: $X = \{n^2+1;$ $n = 0, 1, 2, 3\}$
(Ans) $X = \{1, 2, 5, 10\}$

66) List the elements of the set: $Y = \{x : x^2 - 9 = 0; x > 0\}$
(Ans) $Y = \{3\}$

67) List the elements of the set: $Z = \{x : x^2 - 5x + 6 = 0\}$
(Ans) $Z = \{2, 3\}$

68) If g is a mapping defined on the set of real m excluding -2, find $g(\frac{1}{2})$
(Ans) $\frac{2}{5}$

69) Let the function $R \to R$ be defined by $f(x^2-3x+2)$. find $f(x+3)$.
(Ans) x^2+3x+2

70) Let the function $R \to R$ be defined by $f(x^2-3x+2)$. find $f(2) - f(-4)$
(Ans) -30

71) If P = {Prime numbers between 1 and 15} and Q = {Factors of 15}. find $P \cap Q$.
(Ans) {3, 5}

72) The infinite set {1, 3, 3, 4...} can be written as.
(Ans) $[1, \infty]$

MATIII BY CLEVER-B

(1) Solve $x^2+11x+18=0$ by factorization method. (Ans) $x=-9$ or $x=-2$

(2) Construct and simplify equation whose roots will be $-3, 1$. (Ans) $x^2+2x-3=0$

(3) Solve $x^2+8x+5=0$ by the method of completing the square. (Ans) $x=-0.683$ or $x=-7.317$

(4) Solve $2x^2-3x-4=0$ by formula method. (Ans) $x=-0.851$ or $x=2.351$

(5) Find the Sum and product of the roots of the quadric $2x^2+3x-1=0$ (Ans) $-3/2$ and $-1/2$

(6) Find the quadric equation whose roots are 3 and -2. (Ans) $x^2-x-6=0$

(7) If α and β are the roots of $3x^2-4x-1=0$, find the value of $\alpha+\beta$. (Ans) $4/3$

(8) If α, β are the roots of $3x^2+5x+1=0$, Construct equation whose roots are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$. (Ans) $x^2-5x-3=0$

(9) Find the Sum and product of the roots of the quadratic equation $x^2-4x-3=0$ (Ans) 4 and -3

MATIII BY CLEVER-B

(10) Find the quadratic equation whose roots are $3/4$ and $1/2$. (Ans) $8x^2-10x+3=0$

(11) If α and β are the roots of $3x^2-4x-1=0$, find the value of $\alpha\beta$. (Ans) $-1/3$

(12) If the roots of the equation $2x^2+5x+3=0$ are α and β, obtain the equation of whose roots are $\alpha^2+\beta^2$. (Ans) $13/14$

(13) Find the Sum and product of the roots of the quadratic equation $\frac{1}{2}x^2-3x-1=0$ (Ans) -6 and -2

(14) Find the quadratic equation whose roots are $\frac{1}{2}$ and 5. (Ans) $2x^2-11x+5=0$

(15) Find the value of k for which $16x^2-24x+k$ is a perfect square. (Ans) 9

(16) Find the constants q, p and q such that $3x^2-12x+16=q(x+p)^2+q$. (Ans) $q=2, p=-2$ and $q=4$

(17) If one root of the equation $27x^2+5x+8=0$ is known to be the square of the other, find b. (Ans) -30

(18) If α, β are the roots of $x^2+3x=5$, Construct the value of $\alpha-\beta$ (Ans) $\sqrt{29}$

ANSWER - B

19) Given the values of $\alpha+\beta = 4/3$ and $\alpha.\beta = -1/3$, find the value of $\alpha - \beta$.

(Ans) $\sqrt{18/9}$

20) Given the values of $\alpha+\beta = 4/3$ and $\alpha.\beta = -1/3$, find the value of $\frac{1}{\alpha+1}$ and $\frac{1}{\beta+1}$.

(Ans) $-5/3$

21) In the expansion of $(1+2x)^5$, what is the coefficient of x^4?

(Ans) 80

22) What is the coefficient of x^2 in expansion of the first five terms of the ~~bion~~ binomial expansion $(1+x)^{-(2)}$.

(Ans) 3

23) In expansion of $(1+5x)^2$ by binomial theorem, what is the coefficient of x^2?

(Ans) 250

24) Evaluate the factorial expression $\frac{(n+2)!}{n!}$

(Ans) n^2+3n+2

25) Find the value of x if $\frac{(2x+1)!}{2x!} = 9$

(Ans) 4

26) The expression $\frac{n!}{(n+1)!}$

(Ans) n

27) Find the 4th term in the binomial expansion $(x+\frac{1}{2})^8$

(Ans) $7x$ ⁵

28) Find the ~~bar~~ third term of the binomial expansion $(1+x)^m$

(Ans) $\frac{m(m-1)x^2}{2!}$

29) Find the coefficient of the 3rd term of the binomial expansion $(1+2x)^{1/3}$.

(Ans) $-4/9$

30) The coefficient of the 4th term in the binomial expansion of $(1+x)^{-(p)}$

(Ans) $-\frac{p(p+1)(p+2)}{3!}$

31) Evaluate the 5th term in the binomial expansion of $(1+x)^{1/n}$

(Ans) $\frac{(1-n)(1-2n)(1-3n)x^4}{4!n^4}$

32) Express $\frac{(10-2x)}{(x-3)(x-1)}$ in partial fractions.

(Ans) $\frac{2}{(x-3)} + \frac{4}{(x-1)}$

33) Given that $\frac{(8x-28)}{(x-2)(x-4)} = \frac{A}{(x-2)} + \frac{B}{(x-4)}$ find the values of A and B.

(Ans) $A=6, B=2$.

34) Express $\frac{(x+7)}{(x^2-7x+10)}$

(Ans) $\frac{4}{(x-5)} - \frac{3}{(x-2)}$

35) Express $\frac{(35x-14)}{(7x-2)^2}$ in partial fractions

(Ans) $\frac{5}{(7x-2)} - \frac{4}{7x-2)^2}$

36) Given that $\frac{42x+44}{(6x+5)^2} = \frac{A}{(6x+5)} + \frac{B}{(6x+5)^2}$.

find A and B.

(Ans) $A=7, B=9$ //

37) If $\frac{x^2+3}{x^2-2}$

Value

(Ans) 5

38) The

is eq

(Ans) 2

~~39~~ ~~Ex~~

39) Reso

(Ans) 1

$\frac{2(x}{}$

40) Res

into its

(Ans) 3

$\frac{}{x+8}$

41) Reso

into pa

(Ans) 1

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42) Res

into

(Ans)

$x+$

37) If in partial fraction $\frac{x^2+3x-10}{x^2-2x-3} = 1 + \frac{Bx+7}{(x+1)(x-3)}$, find the value of B

(Ans) 5

38) The fraction $\frac{2x^3+3x^2-54x+50}{x^2+2x-24}$ is equivalent to

(Ans) $2x-1 - \frac{4x-26}{(x+6)(x-4)}$

39) Resolve into partial fractions $\frac{1}{x(x^2-1)}$

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

40) Resolve into partial fractions $\frac{4x-13}{(x+8)(x-7)}$

into its partial fractions:

(Ans) $\frac{3}{x+8} + \frac{1}{x-7}$

41) Resolve the expression $-\left(\frac{x+3}{x^2+x-6}\right)$

into partial fractions:

(Ans) $\frac{1}{2-x}$

42) Resolve the expression $\frac{8x-6}{x^2-4x-21}$

into partial fractions.

(Ans) $\frac{3}{x+3} + \frac{5}{x-7}$

43) If $\frac{2x+2}{x^2+3x+2} + \frac{x+3}{x^2+x-6} = \frac{A}{x+2} + \frac{B}{x-2}$

then $A+B =$

(Ans) 3

44) If $\frac{x+1}{x^2-1} + \frac{x-2}{x^2+4} = \frac{A}{x-1} + \frac{B}{x+2}$.

find $A+B$

(Ans) 2

45) If $\frac{6x^2+17x+6}{x(x+2)(x+3)} = \frac{A}{x} + \frac{B}{x+2} + \frac{C}{x+3}$

find the value of $A+B-C$

(Ans) 0

46) $\frac{x^3+1}{x^2+1}$ is equivalent to

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

47) Simplify the partial fractions: $\frac{1}{x+2} + \frac{1}{x-3}$

are a single fraction.

(Ans) $\frac{2x+1}{(x+2)(x-3)}$

48) Resolve $\frac{2}{x-3} - \frac{1}{2x+1}$ into single fraction.

(Ans)

49) $\frac{x^3}{x^2-1}$ is equivalent to

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

5) $\log_2(x-3) + \log_2 x = 2$.

$\log_2[(x-3)x] = 2$.

$x(x-3) = 2^2$

$x(x-3) = 4$.

$x^2 - 3x = 4$

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

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

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

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

$x+1=0$; $x-4=0$

$x = -1$ or 4.

6) $\log_3 27 + 2\log_3 9 - \log_3 54$.

$\log_3 27 + \log_3 9^2 - \log_3 54$

$\log_3 27 + \log_3 81 - \log_3 54$

$\log_3 \left(\frac{27 \times 81}{54}\right)$

$\log_3 \left(\frac{81}{2}\right)$

$\log_3 81 - \log_3 2$

$\log_3 3^4 - \log_3 2$

$4\log_3 3 - \log_3 2$

$4 - \log_3 2$.

MATIII BY CLEVER — B

* Find the real part of $\frac{2+3i}{3+2i}$

* Resolve $\frac{3x+2}{(x+2)(x-5)}$ into partial fractions

* Express $\cos^2\theta$ in terms of multiple angles

* Given the Universal Set $U=\{1,2,3,4,5,6,7,8\}$ where $A=\{1,3,5,7\}$, $B=\{1,2,5,7\}$ and $C=\{3,6,7,8\}$. List the members of $A' \cap B \cap C'$

* Given set $X=(1,2,3)$ and set $Y=(3,1,2)$ which of the following statements is true for X and Y

* In an examination, 18 students passed MATIII, 17 students passed PHYIII, 3, 11 students passed both subject. find the number of students that passed MATIII only.

* Given that $Z=4-2\sqrt{2}i$, find zz

* find the Imaginary of $\left[\frac{1}{2}+\frac{\sqrt{3}}{2}i\right]^2$

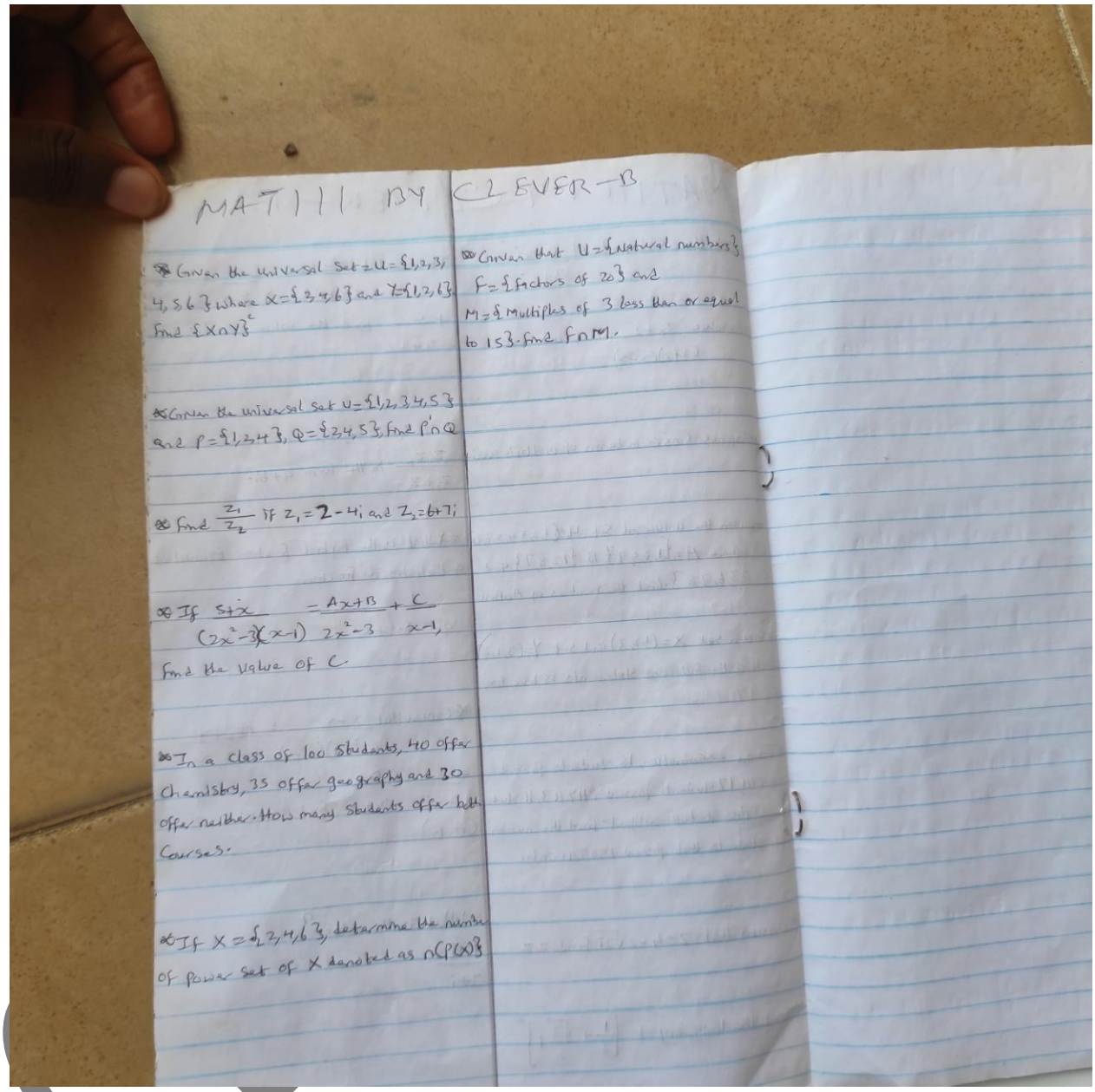
* Given that $\frac{x^2-4x+5}{(x+1)(x^2-9)} = \frac{A}{x+1} + \frac{B}{x+3} + \frac{C}{x+3}$, find the value of B.

* If $z_1=1-3i$, $z_2=-2+5i$, determine $\frac{z_1 z_2}{z_1+z_2}$ in the form $a+bi$.

* What is the partial fraction equivalent of the rational function $\frac{1}{ax^2+bx+c}$

* Given that $\frac{x-5}{(x^2-4)(x^2-9)} = \frac{A}{x-2} + \frac{B}{x+2} + \frac{C}{x-3} + \frac{D}{x+3}$, find the value of (A, B)

* What is the value of a given $a+ib = \frac{9}{\frac{1-i}{2+i}}$



MATHS BY CLEVER-B

Given the Universal Set = U = {1, 2, 3, 4, 5, 6} where X = {2, 4, 6} and Y = {1, 2, 6}. find $\{X \cap Y\}^2$

Given the universal set U = {1, 2, 3, 4, 5} and P = {1, 2, 3, 4}, Q = {2, 4, 5}, find $P' \cap Q$

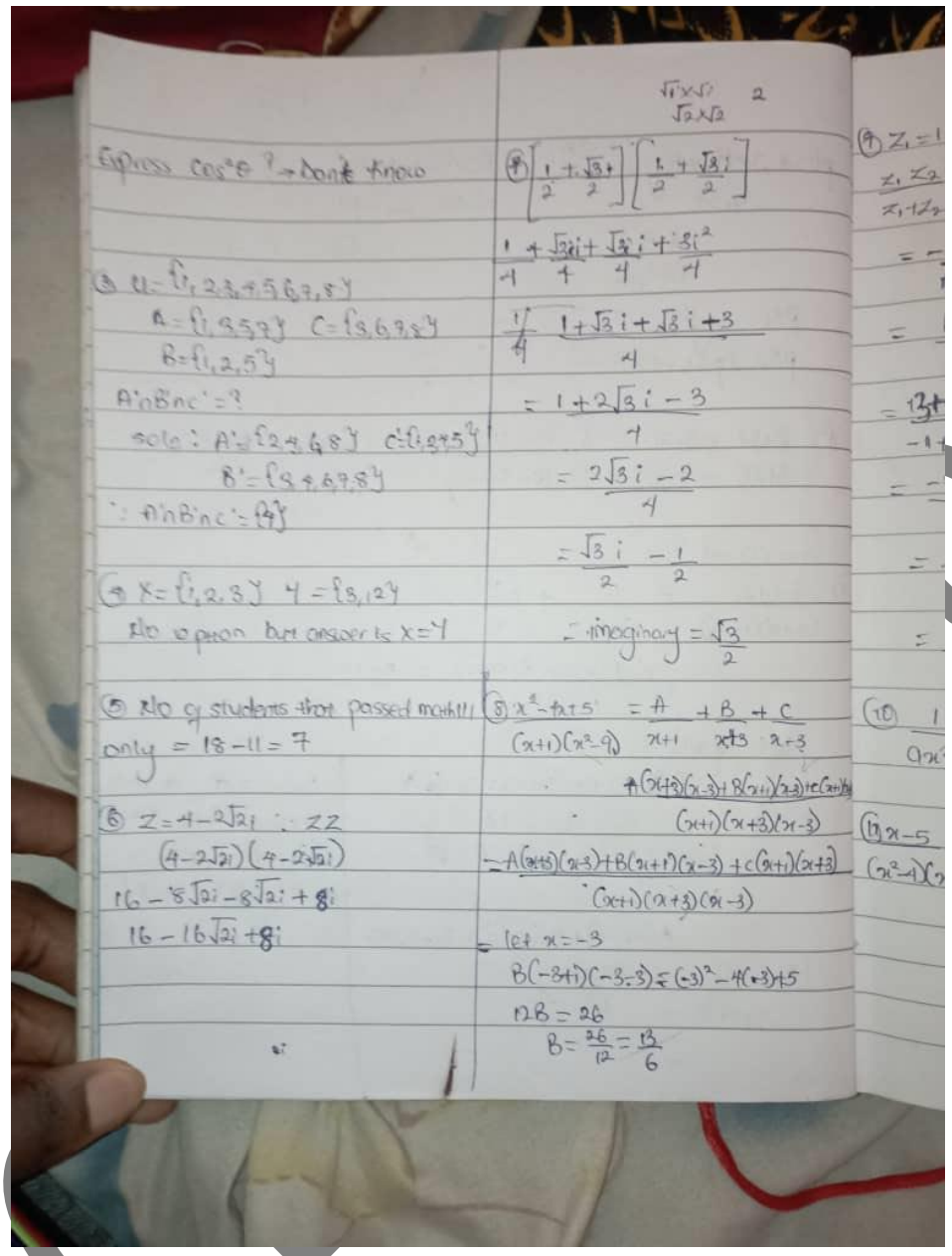
Find $\frac{z_1}{z_2}$ if $z_1 = 2 - 4i$ and $z_2 = 6 + 7i$

If $\frac{5+x}{(2x^2-3)(x-1)} = \frac{Ax+B}{2x^2-3} + \frac{C}{x-1}$, find the value of C.

In a class of 100 students, 40 offer Chemistry, 35 offer geography and 30 offer neither. How many students offer both courses.

If X = {2, 4, 6}, determine the number of power set of X denoted as n{P(X)}

Given that U = {Natural numbers}
F = {Factors of 20} and
M = {Multiples of 3 less than or equal to 15}. find F ∩ M.



Express $\cos^2\theta$? → Don't know

③ $U=\{1,2,3,4,5,6,7,8\}$

$A=\{1,3,5,7\}$ $C=\{5,6,7,8\}$

$B=\{1,2,5\}$

$A \cap B \cap C' = ?$

Sol: $A'=\{2,4,6,8\}$ $C'=\{1,2,3,4\}$

$B'=\{3,4,6,7,8\}$

$\therefore A \cap B \cap C' = \{\}$

④ $X=\{1,2,3\}$ $Y=\{3,12\}$

No option but answer is $X=Y$

⑤ No of students that passed math III only $= 18-11=7$

⑥ $Z=4-2\sqrt{2}i$ $\therefore ZZ$

$(4-2\sqrt{2}i)(4-2\sqrt{2}i)$

$16-8\sqrt{2}i-8\sqrt{2}i+8i$

$16-16\sqrt{2}i+8i$

$\frac{\sqrt{1}\times\sqrt{1}}{\sqrt{2}\times\sqrt{2}}$ 2

⑧ $\left[\frac{1}{2}+\frac{\sqrt{3}}{2}\right]\left[\frac{1}{2}+\frac{\sqrt{3}}{2}\right]$

$\frac{1+\frac{\sqrt{3}i}{4}+\frac{\sqrt{3}}{4}i+\frac{3i^2}{4}}{4}$

$\frac{1}{4}\,\frac{1+\sqrt{3}i+\sqrt{3}i+3}{4}$

$=\frac{1+2\sqrt{3}i-3}{4}$

$=\frac{2\sqrt{3}i-2}{4}$

$=\frac{\sqrt{3}i}{2}-\frac{1}{2}$

$\therefore$ imaginary $=\frac{\sqrt{3}}{2}$

⑨ $\frac{x^2-x+5}{(x+1)(x^2-9)}=\frac{A}{x+1}+\frac{B}{x+3}+\frac{C}{x-3}$

$\frac{A(x+3)(x-3)+B(x+1)(x-3)+C(x+1)(x+3)}{(x+1)(x+3)(x-3)}$

$=\frac{A(x+3)(x-3)+B(x+1)(x-3)+C(x+1)(x+3)}{(x+1)(x+3)(x-3)}$

let $x=-3$

$B(-3+1)(-3-3)=(-3)^2-1(-3)+5$

$12B=26$

$B=\frac{26}{12}=\frac{13}{6}$

$-1+2i$

⑨ $z_1 = 1-3i,\ z_2 = -2+5i$

$\frac{z_1 z_2}{z_1 + z_2} = \frac{(1-3i)(-2+5i)}{1-3i+(-2+5i)}$

$= \frac{-2+5i+6i-15i^2}{1-3i-2+5i}$

$= \frac{11i+13}{2i-1} \times \frac{-1}{-1}$

$= \frac{13+11i}{-1+2i} \times \frac{-1-2i}{-1-2i}$

$= \frac{-13-26i-11i-22i^2}{1+2i-2i-4i^2}$

$= \frac{9-37i}{5}$

$= \frac{9}{5} - \frac{37i}{5}$

⑩ $\frac{1}{ax^2+bx+c} = \frac{Ax+B}{ax^2+bx+c}$

⑪ $\frac{x-5}{(x^2-4)(x^2-9)} = \frac{A}{x-2} + \frac{B}{x+2} + \frac{C}{x-3} + \frac{D}{x+3}$

$= \frac{A(x+2)(x-3)(x+3) + B(x-2)(x-3)(x+3) + C(x-2)(x+2)(x+3) + D(x-2)(x+2)(x-3)}{(x-2)(x+2)(x-3)(x+3)}$

let $x = -2$

$B(-2-2)(-2-3)(-2+3) = -2-5$

$20B = -7$

$B = \frac{-7}{20}$

let $x = 2$

$A(2+2)(2-3)(2+3) = 2-5$

$-20A = -3$

$A = \frac{3}{20}$

⑫ $\frac{1-i}{2+i} \times \frac{2-i}{2-i} = \frac{2-i-2i+i^2}{4-2i+2i-i^2}$

$= \frac{1-3i}{5}$

$a = \frac{1}{5}$

⑬ $U = \{1,2,3,4,5,6\}$

$X = \{3,4,6\}$

$Y = \{1,2,6\}$

$(X \cap Y)' = \{6\}$

$\{X \cap Y\}' = \{1,2,3,4,5\}$

⑭ $U = \{1,2,3,4,5\}$

$P = \{1,2,4\}$ $Q = \{2,4,5\}$

$P' \cap Q = ?$

$P' = \{3,5\}$

$P' \cap Q = \{5\}$

$x(A+B)=1$

(15) $\frac{z_1}{z_2} = ?$

$z_1 = 2-4i$, $z_2 = 6+7i$

$\frac{2-4i}{6+7i} \times \frac{6-7i}{6-7i} = \frac{12-14i-24i+28i^2}{36-42i+42i-49i^2}$

$= \frac{-16-38i}{85}$

(16) $\frac{5+x}{(2x^2-3)(x-1)} = \frac{Ax+B}{2x^2-3} + \frac{C}{x-1}$

$\frac{5+x}{(2x^2-3)(x-1)} = \frac{Ax+B(x-1)+C(2x^2-3)}{(2x^2-3)(x-1)}$

$Ax+Bx-B+2Cx^2-3C = 5+x$

$A+B=1$

$2Cx^2 = 0$

$-3C-B=5$

$C = \frac{0}{2x^2} = 0$

(17) ~~$40-x+35-x+30=100$~~

$40+x+35-x+30=100$

$105-x=100$

$-x=100-105$

~~$-x=-25$~~ $x=5$

~~$x=25$~~

(18) Power $= 2^n$

$= 2^3 = 8$

(19) U = {natural numbers}

$F = \{1,2,4,5,10,20\}$

$M = \{3,6,9,12,15\}$

$F \cap M = \{\}$

(1) $\frac{2+3i}{3+2i} \times \frac{3-2i}{3-2i} = \frac{6-4i+9i-6i^2}{9-6i+6i-4i^2} = \frac{6+5i+6}{9+4} = \frac{12+5i}{13}$

$\frac{3x+2}{(x+2)(x-5)} = \frac{A}{x+2} + \frac{B}{x-5}$

$\frac{A(x-5)+B(x+2)}{(x+2)(x-5)} = \frac{3x+2}{(x+2)(x-5)}$

let $x=5$

$\therefore A(5-5)+B(5+2) = 3(5)+2$

$7B = 17$

$B = \frac{17}{7}$

let $x=-2$

$A(-2-5)+B(-2+2) = 3(-2)+2$

$-7A = -4$

$A = \frac{4}{7}$

$\therefore \frac{3x+2}{(x+2)(x-5)} = \frac{4}{7(x+2)} + \frac{17}{7(x-5)}$

$= \frac{1}{7}\left(\frac{4}{x+2} + \frac{17}{x-5}\right)$

1) Evaluate $\left(\frac{8x^3y^6}{27x^6y^3}\right)^{1/3}$ Ans $(2y/3x)$.

2) Evaluate $\log_{27} 3$ Ans $(1/3)$

3) What is the value of m if;
$\log_2 M = -4$ $(M = -1/16)$.

4) Solve for x if $2^x = 0.125$
(Ans: -3)

5) Solve the equation
$\log_2(x-3) + \log_2 x = 2$ (Ans: 4 and -1)

6) Simplify $\log_3 27 + 2\log_3 9 - \log_3 54$.

Ans $(4 - \log_3 2)$

7 Simplify $\frac{1}{2}\log_4 8 + \log_4 32 - \log_4 2$

Ans $(11/4)$

8) What is the modulus and Argument of $1-i$
Ans $(\sqrt{2}, 315°)$.

9) Solve for x, $\log x = 1/3 \log 27$.
Ans (3)

Solution

1) $\left(\frac{8x^3y^6}{27x^6y^7}\right)^{1/3} = \frac{8^{1/3}x^{3\times1/3}y^{6\times1/3}}{27^{1/3}x^{6\times1/3}y^{3\times1/3}}$

$= \frac{\sqrt[3]{8}\,xy^2}{\sqrt[3]{27}\,x^2y} = \frac{2xy^2}{3x^2y}$

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

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

$= \frac{2}{3}\times\frac{1}{x}\times y = \frac{2y}{3x}$

2) $\log_{27}3 = \log_{3^3}3 \Rightarrow \frac{1}{3}\log_3 3$

$= 1/3 \times 1 = 1/3.$

3) $\log_2 M = -4$; $M = 2^{-4} = \frac{1}{2^4} = \frac{1}{16}$

4) $2^x = 0.125$

$2^x = \frac{125}{1000}$

$2^x = \frac{1}{8}$

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

$2^x = 2^{-3}$

2 Cancels out

$x = -3$

7) $\frac{1}{2}\log_4 8 + \log_4 32 - \log_4 2$

$\frac{1}{2}\log_{2^2} 2^3 + \log_{2^2} 2^5 - \log_{2^2} 2$

$\frac{1}{2}\times\frac{1}{2}\times 3\log_2 2 + \frac{1}{2}\times 5\log_2 2 - \frac{1}{2}\log_2 2$

$\frac{3}{4}\log_2 2 + \frac{5}{2}\log_2 2 - \frac{1}{2}\log_2 2$

$\frac{3}{4} + \frac{5}{2} - \frac{1}{2} \Rightarrow \frac{3}{4} + 2 = \frac{11}{4}$

8) $1-i$, $x=1$, $y=-1$

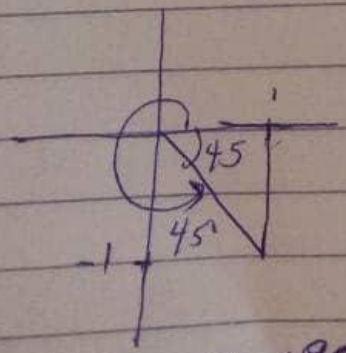
Modulus $= \sqrt{x^2+y^2}$

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

$= \sqrt{1+1} = \sqrt{2}$.

Argument $= \tan^{-1}\left(\frac{y}{x}\right) = \tan^{-1}\left(\frac{1}{1}\right)$

$= 45^\circ$



Argument $= 90+20+90+45$

$= 315^\circ$

9) $\log x = \frac{1}{3}\log 27$

$\log x = \log 27^{1/3}$

$\log x = \log \sqrt[3]{27}$

$\log x = \log 3$

$x = 3$.