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DEPARTMENT OF MATHEMATICAL SCIOENCES

MAT101-ELEMENTARY MATHEMATICS I

2018/2019 HARMATTAN SEMESTER EXAMINATION

NAME: ……MATRIC NO:……DEPT:…….

1. The sum of an A.P. is 340, the first term is 7 and the common difference is 6. Calculate the number of terms in the sequence.

A. 7

*B. 10

C. 11

D. -10

E. 68

2. A ladder 9cm long leans against a vertical wall making an angle of 64° with the horizontal ground. Calculate correct to one decimal place, how far the foot of the ladder is from the wall.

A. 4.0m

B. 5.8m

C. 7.1m

*D. 3.9m

E. 40m

3. Write the complex number $\frac{1+i}{1-i}$ into polar form

*A. $cos\pi + isin\frac{3\pi}{4}$

B. $cos\frac{\pi}{4} + isin\frac{\pi}{4}$

C. $cos\frac{\pi}{6} + isin\frac{\pi}{6}$

D. $cos\frac{3\pi}{4} + isin\frac{3\pi}{4}$

E. $cos\pi + isin\frac{3\pi}{4}$

4. In a class of 20 boys, 16 play soccer, 12 play hockey and two are not allowed to play games. How many students play soccer and hockey?

A. 6

*B. 10

C. 8

D. 2

E. 20

5. In an examination, 18 candidates passed Mathematics, 17 candidates passed Physics, 11 candidates passed both subjects and one candidate failed both subjects. Find the number of candidates that passed Mathematics only.

A. 6

*B. 7

C. 2

D. 3

E. 5

6. Express $\frac{4+2i}{5-i}$ in t he form $x + iy$

A. $\frac{7}{3} + i\frac{9}{13}$

*B. $\frac{9}{13} + i\frac{7}{13}$

C. $4 + \frac{5}{2}i$

D. -3

E. 2+3i

7. What is the coefficient of x^3 in the expansion of $(3+2x)^6$

*A. 4320

B. 64

C. 576

D. 2916

E. 234

8. Expand $(2+x)^{-3}$

A. $\frac{1}{4} + \frac{3}{16}x + \frac{3}{16}x^2$

*B. $\frac{1}{8} - \frac{3}{16}x + \frac{3}{16}x^2$

C. $1 - \frac{3}{2}x + \frac{3}{2}x^2$

D. $\frac{1}{8} + \frac{3}{16}x - \frac{3}{16}x^2$

E. $1 - \frac{3}{16}x + \frac{3}{16}x^2$

9. Examine the nature of the roots of the quadratic equation $x^2 - 3x - 10 = 0$

A. complex roots

*B. real and distinct roots

C. real and equal roots

D. all of the above

E. None of the above

10. If α and β are the roots of $5x^2 - 7x - 3 = 0$ form the equations whose roots are $\alpha - \frac{1}{\beta}$ and $\beta - \frac{1}{\alpha}$

A. $75x^2 + 68x - 45 = 0$

*B. $15x^2 - 56x - 64 = 0$

C. $9x^2 + 15x - 1 = 0$

D. $x^2 - 27x + 1 = 0$

E. $x^2 - 7x + 1 = 0$

11. The common ration of a G.P. is 2, if the 5th term is greater than the 1st term by 45, find the 5th term.

a. 3

B. 6

C. 45

*D. 48

E. -4

12. Number of terms of a Harmonic sequence can be

a. 1

B. 2

C. 3

*D. 0

E. 4

13. 2, 4, 6, 8, 10, 12, … is an example of ……

A. Geometric Progression

*B. Arithmetic Progression

C. Geometric series

D. Arithmetic series

E. Harmonic series

14. Series obtained by adding term of Arithmetic sequences is called

A. harmonic

B. geometric

*C. arithmetic

D. infinite series

E. geometric

15. Sum of series $1 + \frac{1}{3} + \frac{1}{3^2} +$ ... is

a. 2

*B. $\frac{3}{2}$

C. $\frac{4}{3}$

D. $\frac{10}{9}$

E. $\frac{2}{3}$

16. If a and H are arithmetic and harmonic mean between 2 and 3, then A+H =

A. $\frac{49}{20}$

*B. $\frac{49}{10}$

C. $\frac{49}{5}$

D. $\frac{32}{8}$

E. $\frac{32}{10}$

17. Arithmetic Mean between 9 and 11 is

*A. 10

B. 9

C. 5

D. 0

E. 8

18. Expand a^2+b^2

A. (a+b)(a-ib)

B. (a-b)(a-b)

C. (a+b)(a+b)

D. $(a+b)^2$

*E. (a+ib)(a-ib)

19. If Z_1=2+i, Z_2=1+3i, hence (Z_1-Z_2)=

A. 1

*B. i

C. 2i

D. 2

E. 3i

20. $|Z_1+Z_2|=$

A. $>|Z_1|+|Z_2|$

B. $<|Z_1|+|Z_2|$

C. $\geq Z_1+Z_2$

*D. $\leq|Z_1|+|Z_2|$

E. $<Z_1+Z_2$

21. Polar form of a complex number is

A. $r(tan\theta + icot\theta)$

B. $r(sec\theta + icosec\theta)$

*C. $r(cos\theta + isin\theta)$

D. $r(Sin\theta + icoc\theta)$

E. $r(cos\theta + sin\theta)$

22. Arithmetic Mean between x-3 and x+5 is

A. x-1

B. x+2

*C. x+1

D. 2x-1

E. 2x+2

23. Find the sum of the first five terms of the G.P. 2, 6, 18, …

A. 484

B. 243

*C. 242

D. 121

E. 245

24. What is the constant term in the expansion of $(3+2x)^6$

*A. 729

B. 2916

C. 4860

D. 3240

E. 64

25. Let U={1,2,3,4}, P={2,3} and Q={2,4}. What is $(PnQ)^1$?

A. {1,2,3}

*B. {1,3,4}
C. {2,3}
D. {1,3}
E. {2,4}

26. An arc of a circle of radius 6cm is 8cm long, find the area of the sector.
A. 5 ½ cm^2
B. 36cm^2
*C. 24cm^2
D. 84cm^2
E. 28cm^2

27. If tan$\alpha = \frac{1}{5}, tan\beta = \frac{4}{19}, tan\gamma = \frac{2}{5}$, obtain the value of tan $(\alpha + \beta + \gamma)$
A. 11.3
B. 21.9
C. 11.8
*D. 1
E. 0.2

28. A rod of length $7\sqrt{2}cm$ is inclined to the horizontal at an angle of $\frac{\pi}{4}$ radians. A shadow is cast Immediately below it from a lamp directly overhead. What is the length of the shadow?
A. 7cm
*B. $7\sqrt{2}cm$
C. $\frac{7}{2}cm$
D. $\frac{\sqrt{2}}{7}cm$
E. $\frac{1}{7\sqrt{2}}cm$

29. Find the 4th term of an A.P. whose first term is 2 and the common difference is 0.5
A. 0.5
B. 2.5
*C. 3.5
D. 4.5
E. -2.5

30. An arc subtends an angle of 150^o at the centre of a circle of radius 12cm, find the length of the arc.

A. 5πcm
B. 2πcm
*C. 10πcm
D. 15πcm
E. 3πcm

31. If A={a,b,c}, B={a,b,c,d,e} and C={a,b,c,d,e,f}. find (AuB)n (AuC)
A. {a,b,c,d}
*B. {a,b,c,d,e}
C. {a,b,c,d,d,e,f}
D. {a,b}
E. {a, f}

32. If $cos60^0 = \frac{1}{2}$, which of the following angles has a cosine of ½?
*A. 30^o
B. 120^o
C. 300^0
D. 150^0
E. 12^o

33. The angle of a sector of a circle of radius 10.5cm is 120^o. Find the perimeter of the sector.
A. 22cm
B. 33.5cm
*C. 43cm
D. 66cm
E. 115.5cm

34. Cos 75^o has the same value as
A. cos115^o
*B. cos255^o
C. cos285^o
D. –sin165^o
E. –sin255^o

35. At point 500m from the base of a water tank the angle of elevation of the top of the tank is 45^o. Find the height of the tank.
A. 250m
B. 353m

C. 345m

D. 343m

*E. 500m

36. Calculate the sum to infinity of 1+$\frac{1}{3}+\frac{1}{9}+\frac{1}{27}$ …

A. 1

*B. $\frac{3}{2}$

C. $\frac{1}{3}$

D. $\frac{1}{9}$

E. $\frac{1}{27}$

37. Obtain the Modulus and Argument of the Complex number $\frac{1+2i}{1-3i}$

*A. $\frac{1}{\sqrt{2}}, \frac{3\pi}{2}$

B. $\sqrt{2}, \frac{-5\pi}{6}$

C. $\frac{1}{2}, \frac{\pi}{2}$

D. $\sqrt{2}, \frac{-3\pi}{4}$

E. 1, 0

38. Obtain the discriminant of the equation $x^2 + 3x + 4 = 0$

A. 7

B. 3

C. 4

*D. -7

E. -6

39. Let α and β be the roots of the equation $x^2 - 5x + 4 = 0$. Find the values of $\frac{1}{\alpha} - \frac{1}{\beta}$

A. $\pm\frac{4}{3}$

*B. $\frac{3}{4}$

C. $\pm\frac{3}{4}$

D. $\frac{1}{5}$

E. $\frac{1}{3}$

40. The value of $\sin 210^0$

*A. $-\frac{1}{2}$

B. $-\frac{\sqrt{3}}{2}$

C. $\frac{1}{2}$

D. $\frac{\sqrt{2}}{2}$

E. $\frac{\sqrt{3}}{2}$

41. A Cliff of the bank of a river is 300 metres high. If the angle of depression of a point on the opposite side of the river is 60^0. Find the width of the river.

A. 100m

B. $75\sqrt{3}m$

C. $100\sqrt{3}m$

*D. $200\sqrt{3}m$

E. 300m

42. $S = \{1,2,3,4,5,6\}, T = \{2,4,5,6\}, R = \{1,4,5\}$. Find $\{S \cap T\} \cup R$

A. $\{1,4,5\}$

B. $\{2,4,5\}$

*C. $\{1,2,4,5\}$

D. $\{2,3,4,5\}$

E. $\{1,2,3,4,5\}$

43. Write as a single fraction $\frac{5}{6r} - \frac{3}{4r}$

A. $\frac{r}{12}$

B. $\frac{12}{r}$

C. $\frac{1}{6r}$

D. $\frac{r}{6}$

*E. $\frac{1}{12r}$

44. If $sinx = \frac{12}{13}$ where $0^0 < x < 90^0$, find the value of $1 - \cos^2 x$

A. $\frac{25}{169}$

B. $\frac{64}{169}$

C. $\frac{105}{169}$

*D. $\frac{144}{169}$

E. $\frac{8}{13}$

45. In how many different ways can the letters of the word BANANA be arranged in order?

*A. 720

B. 1260

C. 2520

D. 72

E. 360

46. In a certain class of 40 students each students offers at least one of the Mathematics and Physics. If 22 students offer Physics and 21 students offer Mathematics. How many student offer Physics only?

A. 22

B. 3

C. 25

*D. 19

E. 21

47. In a class, 37 students take at least one of Chemistry, Economics and Mathematics, 8 Students take Chemistry, 19 take Economics and 25 take Mathematics, 12 students take Economics and Mathematics but nobody takes chemistry and Economics. How many Students take both Chemistry and Mathematics?

*A. 3

B. 4

C. 5

D. 6

E. 7

48. If $\tan 0 < 0$, $\sin 0 < 0$, then terminal arm of angle lies in quadrant

*A.1

B. 2

C. 3

D. 4

E. 5

49. $\cos (x + \alpha)$

A. $\cos \alpha$

*B. $-\cos \alpha$

C. $-\sin \alpha$

D. $\sin \alpha$

50. $\sec (\alpha - 90^0) =$

*A. $\operatorname{cosec} \alpha$

B. $-\sec \alpha$

C. $-\cot \alpha$

D. $\cot \alpha$

51. $\cot (90^0 - \alpha) =$

*A. $\tan \alpha$

B. $-\tan \alpha$

C. $-\sin \alpha$

D. $-\cot \alpha$

52. Sin $(^{3\Pi}/_{2} - \theta)$ =
A. sin θ
B. cos θ
C. - sin θ
*D.-cos θ
E. sec θ

53. Every even integer is also
A. Natural number
B. Irrational number
*C. Rational number
D. whole number
E. Real number

54. Every integer is also
A. Irrational number
B. whole number
C. Natural number
*D. Rational number
E. Real number

55. Every natural numbers is also
A. Irrational number
B. Even integer
C. Negative Number
*D. Rational number
E. Positive number

56. Every odd integer is also
*A. Rational number
B. Negative number
C. Irrational number
D. Positive number
E. Real number

57. Find three consecutives integers so that 4 times the square of the third decreased by 3times the square of the first is 41 more than twice the square of the second.
*A. 3,4,5
B. 2,3,4
C. 5,6,7
D.1,2,3
E. 3,5,7

58. Find the sum of all numbers between 5 and 130 which are divisible by 4

A. 2000
B. 2100
*C. 2108
D. 1905
E. 2106

59. What is the Coefficient of x^3 in the expansion of $(3 + 2x)^6$
*A. 4320
B. 64
C. 576
D. 2916
E. 1620

60. Find the Modulus and Amplitude of $1 + i$
*A. $\sqrt{2}, 45^0$
B. $2, 90^0$
C. $2, 45^0$
D. $\sqrt{2}, 90^0$
E. $3, 45^0$

61. Let α and β be the roots of the equation $x^2 - 5x + 4 = 0$. Find the values of $\frac{1}{\propto} - \frac{1}{\beta}$
A. $\pm\frac{4}{3}$
*B. $\frac{3}{4}$
C. $\pm\frac{3}{4}$
D. $\frac{1}{5}$
E. 0.5

62. All the 120 pupils in a school learn Yoruba or Igbo or both. Given that 75 learn Yoruba and 60 learn Igbo. How many learn both language?
A.60
B. 45
*C. 15
D. 120
E. 75

63. All the 120 pupils in a school learn Yoruba or Igbo or both. Given that 75 learn Yoruba and 60 learn Igbo. How many learn Igbo only?
*A.45
B. 30
C. 25
D. 6
E. 60

64. The second tern of an infinite geometric series is $-\frac{1}{2}$ and the third term is $\frac{1}{4}$. Find the sum of the series.
A. 2
*B. 1
C. 3/2
D. 2/3
E. 1/3

65. Given that $\frac{x+5}{(x-1)(x+2)} = \frac{P}{x-1} + \frac{Q}{x+2}$ where P and Q are constant, find the value of (P+Q).
*A. 1
B. 3
C. 2
D. 4
E. -3

66. Which of the following sets are null sets ?
A. {0}
B. Ø
C. { }
*D. Both (b) & (c)
E. 0

67. If A and B are sets and A∪ B= A ∩ B, then

A. A = Φ
B. B = Φ
*C. A = B
D. none of these
E. All of the above

68. If X and Y are two sets, then X ∩ (Y ∪ X) C equals
A. X
B. Y
*C. Ø
D. None of these
E. XY

69. The number of elements in the power set of the set {{a, b}, c} is

A. 8
*B. 4
C. 3
D. 7
E. 6

70. In a language survey of students it is found that 80 students know English, 60 know French, 50 know German, 30 known English and French, 20 know French and German, 15 know English and German and 10 students know all the three languages. How many students know at least one language?

*A. 135
B. 30
C. 10
D. 45
E. 25

71. In a room containing 28 people, there are 18 people who speak English, 15 people who speak Hindi and 22 people who speak Kannada, 9 persons speak both English and Hindi, 11 persons speak both Hindi and Kannada whereas 13 persosn speak both Kannada and English. How many people speak all the three languages?

*A. 6
B. 7
C. 8
D. 9
E. 5

72. In a beauty contest, half the number of experts voted for Mr. A and two thirds voted for Mr. B. 10 voted for both and 6 did not vote for either. How many experts were there in all?

A. 18
B. 36
*C. 24
D. 12
E. None of these

73. Individual Objects in a set are called

*A. element
B. set
C. list
D. None of above
E. element set

74. A group or collection of objects is called

A. element
*B. set
C. list

D. group
E. grouping

75. Set of vowels in English alphabet contains elements
A. {a, b, c, d, e, f}
*B. {a, e, i, o, u}
C. {p, q, r, s, t}
D. {l, m, n, o, p}
E. {a, i, o, u}

76. Set {x: x is an odd number between 10 and 18}

A. {11, 12, 13, 15, 17}
B. {12, 16, 15, 13}
*C. {11, 13, 15, 17}
D. {12, 14, 16, 18}
E. {12, 14, 18}

77. If $a_n = \frac{(-1)^n}{2n-1}$, then $a_5 =$?

A. $\frac{1}{3}$
B. $\frac{-1}{5}$
C. $\frac{1}{7}$
*D. $\frac{-1}{9}$
E. $\frac{2}{7}$

78. What is the sum of the sequence
A. 36
B. 37
C. 38
*D. 39
E. 27

79. What is the 31st term of the sequence: 1, 4, 7, 10,...?
A. 90
*B. 91
C. 92
D. 93
E. 94

80. What is the 11^{th} term of the sequence: $m-2n, m-n, m, \ldots$?

A. $m+n$
B. $m-n$
C. $m+6n$
*D. $m+8n$
E. $m-8n$

81. Common difference of sequence 5,8,11,14,… is

*A. 3
B. −3
C. 0
D. 1
E. 2

82. $2^1 + 2^2 + 2^3 + \ldots + 2^n =$

*A. $2(2^n - 1)$
B. $2(2^{n-1} - 1)$
C. $2(2^{n+1} - 1)$
D. None of Above
E. All of the above

83. Second term of sequence with general term $n^2 - 4/2$ is

A. 3
B. −3
C. 1
*D. 0
E. 2

84. A.P whose nth term is 2n-1 is

A. 1, 3, 6,…
B. 2, 3, 5,…
*C. 1, 3, 5,…
D. 5, 3 ,1,…
E. 1, 3, 5,…

85. How many are there in 20, 25, 30, …, 140

A. 22
*B. 25
C. 23
D. 24
E. 21

86. Find the first term of an AP whose 8^{th} and 12^{th} terms are respectively 39 and 59

A. 5
B. 6
*C. 4
D. 3
E. 2

87. Find the 15^{th} term of the sequence 20,15,10, …
A. -45
B. -55
*C. -50
D. 0
E. 20

88. The sum of the first 16 terms of an AP whose first term and third term are 5 and 15 respectively is
A. 600
B. 765
C. 640
*D. 680
E. 540

89. How many terms are there in the GP 5,20,80,320, …, 20480
A. 5
B. 6
C. 8
*D. 7
E. 4

90. If $x^4 - 3x + 5$ is divided by $2x - 1$, then remainder is
A. $35/16$
B. $-35/16$
*C. -9
D. 3
E. 2

91. Solution of a quadratic equation $x^2 + 5x - 6 = 0$
A. x = -1, x = 6
*B. x = 1, x = - 6
C. x = 1
D. x = 6
E. x = 8

92. If $a < 0$, then function $f(x) = a x^2 + bx + c$ has

*A. maximum value
B. minimum value
C.constant value
D.positive value
E. None of the above

93. If roots of $x^2 - 5x + a = 0$ are equal, then a =

A. 25/5
B. ±25/4
*C. 25/4
D. None of Above
E. 25

94. If ω is imaginary cube root of unity, then ω^3 =

*A. 1
B. 0
C. ω^2
D. 2ω
E. -1

95. Discriminant of quadratic equation $ax^2 + bx + c = 0$ is
A. $b^2 + 4ac$
B. $4ac - b^2$
*C. $b^2 - 4ac$
D. $a^2 - 4bc$
E. $a^2 + 4bc$

96. If α and β are roots of $x^2 - 2x + 3 = 0$, then equation with roots α+2, β+2 is

*A. $x^2 - 6x + 11 = 0$
B. $x^2 + 6x - 11 = 0$
C. $x^2 - 11x + 6 = 0$
D. $x^2 + 11x - 6 = 0$
E. $x^2 + 11x + 6 = 0$

97. Roots of quadratic equation $ax^2 + bx + c = 0$ are real and distinct if
A. $b^2 - 4ac = 0$
*B. $b^2 - 4ac > 0$
C. $b^2 - 4ac < 0$
D. $b^2 - 4ac \geq 0$
E. $b^2 - 4ac$

98. Find the roots of the quadratic equation: $x^2 + 2x - 15 = 0$?
*A. -5, 3

B. 3, 5
C. -3, 5
D. – 3,-5
E. 2. 5

99. Find the roots of the quadratic equation: $2x^2 + 3x - 9 = 0$?
A.3, -3/2
*B.3/2, -3
C.-3/2, 3
D.3/2, 3
E. 3, 2

100. Which of these subsets are equal:

L = {r.t.s} M = {s,t,r,s} N = {t,s,t,r} O = {s,r,s,t}
A. L and M
B. L and N
C. M and O
*D. all are equal
E. None of the above

101. Solve for x if $5^{x^2} = 625^{x+3}$
A. -6 or 2
*B. 6 or -2
C. 3 or 4
D. -3 or 4
E. -4 or 3

102. In a Venn diagram, the overlap between two circles represents:
A. the union of two sets
*B. the intersection of two sets
C. the elements that are in either of two sets
D. the difference between the number of elements in two sets
C. the elements that are in neither of two sets

103. There are 8 students on the curling team and 12 students on the badminton team. What is the total number of students on the two teams if three students are on both teams:
A. 20
*B. 17
C. 15
D. 14
E. 12

104. ……. Is the collection of a well defined objects
A. Power
*B. Set

C. Relation'
D. Conjugate
E. Complementary

105. Anything belonging to a set is called ……. of the set
A. Subsets
B. Domain
*C. Elements
D. Power
E. None of the above

106. The null set is considered to be a …… of every sets.
*A. Subsets
B. Equivalents sets
C. Proper sets
D. Improper sets
E. Equal sets

107. A set which does not contain any element is regarded as …… a
*A. Null set
B. Subsets
C. Super sets
D. Equivalent sets
E. Domain

108. Two sets are set to be …….. if they have the same number of elements

*A. Equal
B. Subsets
C. Equivalents
D. Proper
E. Super

109. Every set is a …… of itself
A. Domain
*B. Subsets
C. Super
D. Equal
E. None of the above

110. In a school of 60 teachers, 32 speak Igbo and 45 speak Hausa. If every teacher in the school speaks at least one of the two languages. How many teachers speak both Igbo and Hausa?
*A. 17
B. 32
C. 45
D. 13

E. 60

111. In a class of 80 students every student had to study Economics or Geography or both Economics and Geography. if 65 students studied geography. how many studied both subjects?
A. 50
B. 60
C. 65
*D. 35
E. 115

112. Simplify $\frac{log_{10}\sqrt{125}+log_{10}\sqrt{27}-log_{10}\sqrt{75}}{log_{10}3-log_{10}5}$
*A. $5\sqrt{5}$
B. $\sqrt{5}$
C. $\sqrt{3}$
D. $log_{10}5$
E. $3\sqrt{5}$

113. Obtain the roots of the equation $x^2 - 5x + 6 = 0$
A. -3, -2
B. -2, 3
*C. 2, 3
D. 3, -2
E. ½, 1/3

114. A …….... is a set of quantities $x_1, x_2, x_3, \cdots$ stated in a definite order
*A. Sequence
B. Set
C. Space
D. Series
E. Progression

115. The sum of all numbers between 5 and 130 which are divisible by 4 is ……..
A. 1208
B. 108
C. 128
*D. 2108
E. 576

116. Evaluate $(1 + i) - (1 - i)$
*A. $2i$
B. 2
C. $-2i$
D. i
E. $-i$

117. Obtain the modulus of $z = \frac{1+2i}{1-(1-i)^2}$

*A. 1
B. 2
C. $2i$
D. $1 + 2i$
E. $1 - i$

118. The 3rd term of a G.P is 10 and the 7th term is 6250. Obtain the common ratio and the first term.

*A. c =5 and a = $\frac{2}{5}$
B. c = $\frac{2}{5}$ and c =5
C. c =3 and a = $\frac{2}{5}$
D. c =5 and a = 2
E. c=2 and a = 5

119. Obtain the coefficient of x^0 in the expansion of $(1 + x)^2$

*A. 1
B. 2
C. 3
D. 0
E. None of the above

120. Obtain the length of the arc of a circle radius 3cm subtending 60^0 at the centre.

A. $-\pi cm$
*B. $\pi cm.$
C. $3\pi cm$
D. $1/3\pi cm$
E. $1/6\pi cm$

121. Find the value of x if $12, x, y, z, -4$ form an Arithmetic Progression

A. 12
B. 0
C. 4
*D. 8
E. -4

122. Find the value of b if $15, a, b, c, 3$ form an A.P

*A. 9
B. 12
C. 0
D. 3
E. 6

123. Calculate the sum to infinity of $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \cdots$

A. 2

*B. 1.5
C. 2.5
D. 3
E. 4

124. What is the coefficient of x^3 into the expansion of $(1-2x)^{-2}$
A. 16
B. -16
*C. -32
D. 32
E. 8

125. If set $P = \{x: 2 \leq x \leq 4\}$, then set P is ?
A. $= \{1,2,3,4\}$
B. $= \{1,2,3\}$
*C. $= \{2,3,4\}$
D. $= \{2,4\}$
E. $= \{3\}$

126. Solve for x if $5^{x^2} = 625^{x+3}$
A. -6 or 2
*B. 6 or -2
C. 3 or 4
D. -3 or 4
E. -4 or 3

127. Solve for y if $9^y - 4(3^y)+3=0$
A. 1 or 3
B. -1 or -3
*C. 0 or 1
D. -1 or 0
E. -3 or 1

128. Find the 16^{th} term of the sequence 3,6,9,12, ...
A. 42
B. 54
C. 46
D. 36
*E 48

129. If $n(A) = 12, n(B) = 10$ and $n(A \cup B) = 17$. Find $n(A \cap B)$
A. -5
B. 10
*C. 5
D. 8
E. 12

130. Simplify $y = a^{\log_a x}$

*A. $y = x$

B. $y = x^2$

C. $y = \frac{1}{x}$

D. $y = \frac{1}{x^2}$

E. $y = \log_a x$

131. Express the complex number $(2-3i)(1+2i)$ in the form $a+ib$

A. $7+2i$

B. $3+8i$

C. $8-i$

* *D.* $8+i$

E. $7+2i$

132. Find the values of x *and* y that satisfy the equation $(x+y)+i(x-y)=6+4i$

* *A.* 5, 1

B. 5, 7

C. 4, 3

D. 7, 3

E. 7, 5

133. If $z = 2+3i$, find the real and imaginary parts of the complex number $z - \frac{1}{z}$

A. $\frac{13}{24}, \frac{-42}{13}$

* *B.* $\frac{24}{13}, \frac{-42}{13}$

C. $\frac{12}{13}, \frac{32}{13}$

D. $\frac{-42}{13}, \frac{32}{13}$

E. $\frac{23}{13}, \frac{-32}{13}$

134. Simplify $\frac{1+i}{1-i}$

A. 1

B. $1+i$

* *C.* i

D. $-i$

E. $1-i$

135. If $z_1 - 2i$ *and* $z_2 = 3+2i$, *what is* $z_1 z_2$?

A. $1-2i$

B. $8-i$

C. $3+i$

* *D.* $8+i$

E. $2+i$

136. Find the value of $z+3-4i$

* *A.* 5

B. 7

C. 8

D. 3

E. 4

137. If $z-3i$ *and* $z_2 = 2-i$, *simplify* $\frac{z_1}{z_2}$

A. $\frac{3-5i}{3}$

B. $\frac{5+3i}{5}$

C. $\frac{7+4i}{5}$

* *D.* $\frac{7-4i}{5}$

E. $\frac{9+4i}{5}$

138. What is the polar form of the complex number $3+4i$

A. $5\left(\cos\frac{3}{5}+i\ \sin\frac{4}{5}\right)$

B. $5\left(\cos\frac{3}{4}+i\ \sin\frac{4}{5}\right)$

C. $5\left(\cos\frac{4}{5}-i\ \sin\frac{3}{4}\right)$

D. $3\left(\cos\frac{3}{4}+i\ \sin\frac{4}{5}\right)$

* *E.* $5\left(\cos\frac{4}{5}+i\ \sin\frac{3}{4}\right)$

139. Given that $z=1+i$, find the complex conjugate form of the complex number $3z-2$

A. $3-i$

B. $3+2i$

* *C.* $1-3i$

D. $1+3i$

E. $4-2i$

140. Find the modus of $z+2$ *where* $z+1+4i$

A. 4

B. 3

* *C.* 5

D. 7

E. $\frac{5}{3}$

141. Find the value of x *and* y *if* $(2x-y)+i(x+y)=4+2i$

* *A.* 2, 0

B. $0, 2$

C. $(3, 0)$

D. 0, 3

E. $(2, 1)$

142. Simplify $z+\frac{1}{x}$ *if* $z=1+2i$

A. $\frac{4-8i}{3}$

B. $\frac{8+4i}{3}$

* *C.* $\frac{4+8i}{3}$

D. $\frac{5-8i}{3}$

E. None of the above

143. Find the conjugate form of the complex number z^2 given that $z+3-21$

A. $5-12i$

B. $11-3i$

C. $5+12i$

D. $12+5i$

* *E.* $5+12i$

144. Express $(-1+i)^2$ in the form $a+ib$

A. $0-12i$

* *B.* $0-2i$

C. $2+i$

D. $1+2i$

E. $4+3i$

145. Simplify i^9 where i is an imaginary unit of a complex number

A. $1+i$

B. 1

* *C.* i

D. $i+2$

E. $-i$

146. Simplify i^{16} i is where i is an imaginary unit of a complex number

A. $1-i$

* *B.* 1

C. i

D. -1

E. $-i$

147. If the two complex numbers $x+iy$ *and* $p+iq$ are equal, which of the following relations is correct?

A. $x=q,\ y=p$

B. $x=p,\ y=-q$

C. $x=y,\ y=q$

* *D.* $x=p,\ y=q$

E. $x=-p,\ y=-q$

148. What is the polar form of a complex number $z=a+ib$

A. $r(\cos\theta+i\ \sin\theta)$

B $r(\sin\theta+i\ \cos\theta)$

C. $r(\sin\theta-i\cos\theta)$

* *D.* $r(\cos\theta+i\ \sin\theta)$

E. None is correct

149. What is the exponential form of a complex number $r(\cos\theta+i\ \sin\theta),\ \theta$ *is in radian*

* *A.* $re^{i\theta}$

B. $re^{-i\theta}$

C. $-re^{i\theta}$

D. $r\ \theta$

E. $-r\ \theta$

150. Write out the exponential form of a complex number $r(\cos\theta-i\sin\theta)$, θ is in radian

* *A.* $re^{-i\theta}$

B. $-re^{i\theta}$

C. $re^{i\theta}$

D. $i\ \theta$

E. $r\ \theta$

151. Compute the argument of a complex number $z = 4(i+1)$

A. 35^0

B. 60^0

C. 30^0

D. -45^0

* *E.* 45^0

152. If z *and* $\bar{z}$ are conjugate complex numbers, find two complex numbers $z = z_1$ *and* $z = z_2$ that satisfy the equation $3z\bar{z} + 2(z - \bar{z}) = 39 + 12i$

A. $2-3i, -2-3i$

B. $2-3i, 3-2i$

* *C.* $2+3i, -2+3i$

D. $5-2i, 3-2i$

E. $3+2i, 5-3i$

153. *If* $z = x + iy$, find the locus defined as arg $z = \dfrac{\Pi}{4}$

A. $y = \dfrac{1}{x}$

* *B.* $y = x$

C. y

D. -1

E. $-i$

154. If $z = r(\cos\theta + j\sin\theta)$, *what is* z^n ?

A. $r^n(\cos n\theta + i \sin n\theta)$

* *B.* $r^n(\cos n\theta + i \sin n\theta)$

C. $r^n(\sin n\theta + i\cos n\theta)$

D. $r^n(\sin n\theta - i \cos n\theta)$

E. None is correct

155. Simplify $(5+4i)(3+7i)(2-3i)$

A. $111+33i$

B. $133-25i$

* *C.* $115+133i$

D. $125-27i$

E. $122+143i$

156. Given that $f(x)=2x^2-2$, *evaluate* $f(a-1)+f(1)$

* *A.* $2a(a-2)$

B. $a(a+2)$

C. $2a(a+2)$

D. $a(2a+1)$

E. $2(2a-1)$

157. If $z=x+iy$, *find* the locus defined by $|z|=5$

A. $x^2-y^2=25$

* *B.* $x^2+y^2=25$

C. $(x-y)^2$

D. $(x+iy)^2=5$

E. $(x+y)^2=5$

158. If x *and* y are real, solve the equation for x *and* y $\dfrac{ix}{1+iy}=\dfrac{3x+4i}{3y}$

A. $x=\pm 3,\ y=\pm 2$

B. $x=3,\ y=4$

C. $x=\pm 1,\ y=\pm 3$

* *D.* $x=\pm 2,\ y=\pm\dfrac{3}{2}$

E. $x=3+2i,\ y=2$

159. If α *and* β are the roots equation $3x^2-77x+2=0$ find the value of $\dfrac{1}{\alpha^2+\beta^2}$

A. $\frac{4}{5}$

B. $\frac{3}{4}$

**C.* $\frac{9}{37}$

D. $\frac{37}{9}$

E. $\frac{3}{7}$

160. Given that α *and* β are the roots of equation $x^2 + p^x + q = 0$ with $\alpha - \beta = 5$ *and* $\frac{\alpha}{\beta} = \frac{7}{2}$.

Find the values of *p and q*

**A.* $-9, 14$

B. 14, 9

C. 13, 9

D. 2, 3

E. 4, 5

161. The roots of equation $2x^2 + 5x + 3 = 0$ *are* α *and* β. Find the reciprocal of $\frac{\beta}{\alpha} + \frac{\alpha}{\beta}$

A. $\frac{4}{37}$

B. $\frac{3}{37}$

C. $\frac{-39}{4}$

**D.* $-\frac{4}{37}$

E. $\frac{4}{37}$

162. Let $\bigcup = \{x : 0 < x \leq 18\}$, $A = \{x : x \text{ is even}, x \leq 8\}$, $B = \{3, 4, 5, 6\}$.The elements of the universal are

A. $U = \{0, 1, 2, 3, \ldots 18\}$
B. $U = \{1, 2, 3, \ldots 17\}$
C. $U = \{0, 2, 4, 6, \ldots 18\}$
* *D.* $U = \{1, 2, 3, \ldots 18\}$
E. $U = \{0, 2, 3, \ldots 18\}$

163. Let $\bigcup = \{x : 0 < x \leq 18\}$, $A = \{x : x \text{ is even}, x \leq 8\}$, $B = \{3, 4, 5, 6\}$ *Evaluate* $A^c \bigcap B^c$

A. $A^c \bigcap B^c = \{1, 9, 11, 13, 15, 17\}$
B. $A^c \bigcap B^c = \{7, 10, 12, 14, 16, 18\}$
* *C.* $A^c \bigcap B^c = \{1, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18\}$
D. $A^c \bigcap B^c = \Phi$
E. $A^c \bigcap B^c = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18\}$

164. Let $\bigcup = \{x : 0 < x \leq 18\}$, $A = \{x : x \text{ is even}, x \leq 8\}$, $B = \{3, 4, 5, 6\}$. *Verify* $A - B$

A. $A - B = \{2, 8, 18\}$
B. $A - B = \{3, 5\}$
* *C.* $A - B = \{2, 8\}$
D. $A - B = \{3, 4, 5, 6\}$
E. $U = \{2, 4, 6, 8\}$

165. Let $\bigcup = \{x : 0 < x \leq 18\}$, $A = \{x : x \text{ is even}, x \leq 8\}$, $B = \{3, 4, 5, 6\}$ Evaluate $A \Delta B$

A. $A \Delta B = \{2, 8, 18, 6\}$
* *B.* $A \Delta B = \{2, 3, 5, 8\}$
C. $A \Delta B = \{16, 17, 18\}$
D. $A \Delta B = \{2, 4, 5, 6, 8\}$
E. $A \Delta B = \{1, 5, 6, 7\}$

166. If $U = [-\infty, \infty]$, $p = \{x : -6 < x \leq 4\}$ *and* $Q = \{x : -3 < x \leq 9\}$ *Find* $P \cap Q$

* *A.* $P \cap Q = \{-2, -1, 0, 1, 2, 3, 4\}$
B. $P \cap Q = \{-5, -3, -1, 1, 3, 4\}$
C. $P \cap Q = \{-2, -1, 0, 1, 2, 3, 4\}$
D. $P \cap Q = \{-5, -4, -3, -2, -1, 1, 2, 5, 6, 7, 8\}$
E. $P \cap Q = \{-2, 0, 1, 2, 3, 4\}$

167. Let $n(x)$ denote the number of elements in X and $n(Y)$ denotes the number of elements in Y. Given that $n(x) = 42,\ n(XnY)84,\ n(X \cup Y) = 36,\ Find\ n(Y)$

A. 87
B. 85
**C.* 78
D. 76
E. 0

168. Write down all the subsets of $S = \{a,\ b,\ c\}$

A. $\{\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{b, a\}, \{a, b, c\}\}$
B. $\{\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{c, b\}, \{a, b, c\}\}$
**C.* $\{\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, c\}, \{a, b, c\}\}$
D. $\{\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, b, c\}, \{b, a, c\}\}$
E. $\{\phi, \{a\}, \{b\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{b, c\}, \{a, c, d\}\}$

169. What do you understand by the term "Complement of a set"?

A. The set of elements found in a particular set but absent the universal

*B. The set of elements found in a universal set but absent in the set itself

C. The set of elements found in a particular set and as well found in universal set

D. The set of elements absent in universal set as well in the set itself

C. None of the above

170. Given the sets $A = \{3, -2, -1,\ 1\},\ B = \{1, -2, 3\},\ C = \{1,\ 2, -3\},\ D = \{-1, -2, -3\}$ which of the following is true?

A. $n(A) = n(B) \neq n(C)$
B. $A \subset B$
C. $B = -D$
**D.* $n(A) \neq n(B)$
E. $n(B) = 2(n(D))$