(GCF-2, GCF-3, VCF-1, VDCF-1, SCF-1)

DATE: 05.09.2021 **MAXIMUM MARKS: 100** **TIMING: 3 Hours**

BUSINESS MATHEMATICS, REASONING & STATISTICS

1. Ans. c
Explanation:

$$f(x) = {}^{x}c_2$$
$$= \frac{x\,(\,x-1\,)}{2}$$
$$= \frac{x^2 - x}{2}$$
$$f'(x) = \frac{2x-1}{2}$$
$$f'(3) = \frac{2\times 3-1}{2} = \frac{5}{2}$$

2. Ans. a
Explanation:

$$C(x) = 2x^3 - 15x^2 + 36x + 15$$
$$C'(x) = 6x^2 - 30x + 36$$
$$C'(x) = 0$$
$$x^2 - 5x + 6 = 0$$
$$x = 2, 3$$
$$C''(x) = 12x - 30$$
$$Put\ x = 3$$
$$C''(x) = 36$$
$$if\ C''(x) > 0$$

The cost will be minimum when x=3

3. Ans. b
Explanation:

$$\boldsymbol{fog}\ (\boldsymbol{x}) = \boldsymbol{f}\ [\boldsymbol{g}(\boldsymbol{x})]$$
$$= f\left[\frac{1}{1-x}\right]$$
$$= \frac{\frac{1}{1-x} - 1}{\frac{1}{1-x}}$$
$$= x$$

4. Ans. d
Explanation:

Relation R is Symmetric and Transitive but not Reflexive because (3,3) does not belong to R.

5. Ans. b
Explanation:

$$\alpha - \beta = \sqrt{(\alpha+\beta)^2 - 4\alpha\beta}$$
$$= \sqrt{(7)^2 - 4(-9)} = \sqrt{85}$$

6. Ans. c
Explanation:
By Option (c)

7. Ans. d
Explanation:

$$x^2 - (sum\ of\ roots)x + product\ of\ roots = 0$$
$$x^2 - (2-\sqrt{3}+2+\sqrt{3})\ x + (2-\sqrt{3})\ (2+\sqrt{3}) = 0$$
$$x^2 - 4x + 1 = 0$$

8. Ans. b
Explanation:
By Option (b)

9. Ans. a
Explanation:

	Machine I	Machine II	
Grade A	2	3	≥ 14
Grade B	1	4	≥ 12

$$2x+3y \geq 14$$
$$x+4y \geq 12$$

10. Ans. d
Explanation:
a, x, c are in A. P. Then,
2 x = a + c
a + c = 50 ……. (i)
a, y, c are in G.P. Then,
y^2 = ac
49 = ac……(ii)
On solving equation (i) and (ii)
a =1, c = 49

11. Ans. a
Explanation:
a = 5,00,000 , d = 15,000

$$S_n = \frac{n}{2}\,[2a + (n-1)\,d]$$

$$= \frac{10}{2}\,[2 \times 5{,}00{,}000 + (10-1)\,15{,}000]$$

= Rs. 56,75,000

12. Ans. d
Explanation:

$$A^{\frac{1}{2}} \times A^{\frac{1}{4}} \times A^{\frac{1}{8}} \ldots\ldots\ldots\ldots\infty$$

$$= A^{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots\ldots\ldots\ldots\infty}$$

$$S\infty = \frac{a}{1-r}$$

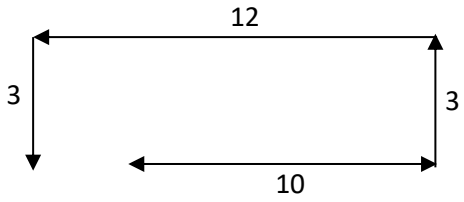
$$= A^{\frac{\frac{1}{2}}{1-1/2}} = A$$

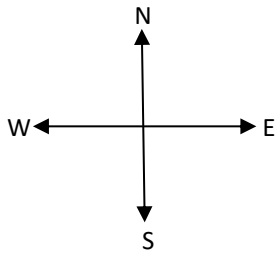
13. Ans. c
Explanation:
? = L

14. Ans. b
Explanation:
White = 4

15. Ans. a
Explanation:
Fruit = Sky

16. Ans. c
Explanation:





17. Ans. c
Explanation:
12 ex. U, V, M etc.

18. Ans. c
Explanation:
26

19. Ans. b
Explanation:

$$CI = 60000\left(1+\frac{6}{100}\right)\left(1+\frac{8}{100}\right)\left(1+\frac{10}{100}\right) - 60{,}000 = Rs.\,15{,}556.80$$

20. Ans. a
Explanation:

$$3P = P\left(1+\frac{r\times 8}{100}\right)$$

$$r = 25\%$$

$$5P = P\left(1+\frac{25\times t}{100}\right)$$

$$t = 16\,years$$

21. Ans. c
Explanation:
$1Rs.\ :\ 50P\ :\ 25P$
$4x,\ 5x,\ 6x$

$$4x + \frac{250\,x}{100} + \frac{150\,x}{100} = 120$$

$$x = 15$$

The number of coins of 25 paisa = 6 x 15 = 90

22. Ans. c
Explanation:
$A : B = 4 : 5] \times 7$
$B : C = 7 : 8] \times 5$
$A : B : C = 28 : 35 : 40$

23. Ans. c
Explanation:
$A = \{1, 2, 3\}$
Subsets of A = Power set of A
$\{\phi, \{1\}, \{2\}, \{3\}, \{1,2\}, \{2, 3\}, \{1, 3\}, \{1,2,3\}\}$

24. Ans. a
Explanation:

$$\frac{1}{1+\frac{a^x}{a^y}} + \frac{1}{1+\frac{a^y}{a^x}}$$

$$= \frac{a^y}{a^y+a^x} + \frac{a^x}{a^x+a^y} = \frac{a^x+a^y}{a^x+a^y} = 1$$

25. Ans. b
Explanation:

$$A = P\left(1+\frac{r}{100}\right)^n$$

$$2000 = P\left(1+\frac{8}{100}\right)^4$$

P = Rs. 1470.06

26. Ans. a
Explanation:

$$\boldsymbol{P} = \frac{\boldsymbol{R}}{\boldsymbol{r}}\left[1-(1+\boldsymbol{r})^{-\boldsymbol{n}}\right]$$

$$5{,}00{,}000 = \frac{\boldsymbol{R}}{.08}\left[1-(1+0.8)^{-3}\right]$$

R = Rs. 1,94,016.75

27. Ans. c
Explanation:
The sum of digit in unit place

$$=(3+4+5+6)\times 3!$$

= 108

28. Ans. b
Explanation:
The number of straight lines

$$= {}^{n}c_2 - {}^{x}c_2 + 1$$

$$= {}^{15}c_2 - {}^{6}c_2 + 1 = 91$$

29. Ans. c
Explanation:
The no. of arrangements = Total no. of arrangements – Two 'o's come together-

$$=\frac{6!}{2!}-5!=240$$

30. Ans. d
Explanation:
Number of ways $= {}^{6}c_3 \times {}^{5}c_2 = 200$

31. Ans. d
Explanation:
Different words can be formed $= \dfrac{11!}{4!4!2!}$

S = 4, P = 2, I = 4

32. Ans. c
Explanation:

By option (c)

33. Ans. b
Explanation:
It is an AP with a=-111 and d=4
T_n = a + (n-1) d
= -111 + (n-1) 4
= - 111 + 4n – 4
= 4n-115
Tn > 0
4n – 115 > 0
$n > 28\frac{3}{4}$

$\because$ The smallest integer greater than $28\frac{3}{4}$ *is* 29.

34. Ans. b
Explanation:
$9, G, G_2, G_3, G_4, 288$

$l = a r^{n-1}$

$288 = 9\, r^5$

$r^5 = 2^5$

$r = 2$

$G_1 = ar = 9 \times 2 = 18$

$G_2 = ar^2 = 9 \times 4 = 36$

$G_3 = ar^3 = 9 \times 8 = 72$

$G_4 = ar^4 = 9 \times 16 = 144$

35. Ans. b
Explanation:
$\log_{10} 80 = \log_{10} (8 \times 10)$
$= \log_{10} (2 \times 4 \times 10)$
$= \log_{10} 2 + \log_{10} 4 + \log_{10} 10$
$= x + y + 1$

36. Ans. d
Explanation:
By option (d)

37. Ans. a
Explanation:
$\frac{2^{n+3} - 10 \times 2^{n+1}}{2^{n+1} \times 6}$

$$= \frac{2^n \times 2^3 - 10 \times 2^n \times 2}{2^{n+1} \times 2 \times 6}$$

$$= \frac{8-20}{12} = \frac{-12}{12} = -1$$

38. Ans. a

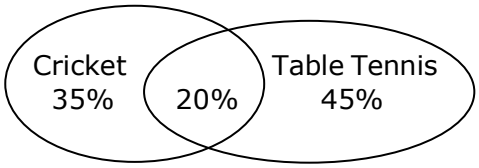
Explanation:

$$\text{Compound annual growth rate} = \left[\frac{v(t_n)}{v(t_o)}\right]^{\frac{1}{t_n - t_o}} - 1$$

$$= \left(\frac{210}{100}\right)^{\frac{1}{4}} - 1 = 26.98\%$$

39. Ans. b

Explanation:



$$\text{No. of students can play cricket} = 35\% + 20\%$$

$$= 55\% \text{ of } 120$$

$$= 66$$

40. Ans. b

Explanation:

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

$$\text{if } x = 1 \quad f(x) \text{ will be undefined}$$

$$A = R - \{1\}$$

41. Ans. d

Explanation:

$$\int \frac{dx}{x + \sqrt{x^2 - 1}} = \int \frac{x - \sqrt{x^2 - 1} \quad dx}{(x + \sqrt{x^2 - 1})\,(x - \sqrt{x^2 - 1})}$$

$$= \int (x - \sqrt{x^2 - 1})\, dx$$

$$= \frac{x^2}{2} - \frac{x}{2}\sqrt{x^2 - 1} + \frac{1}{2} \log\,(x + \sqrt{x^2 - 1}) + C$$

42. Ans. c

Explanation:

$$\int_1^2 (x^2 - 5x + 2)\, dx$$

$$= \left[\frac{x^3}{3} - \frac{5x^2}{2} + 2x\right]_1^2 = -\frac{19}{6}$$

43. Ans. c
Explanation:

$$\frac{d}{dx}(x^2 \log x)$$

$$= x^2 . \frac{1}{x} + 2x \log x$$

$$= x\,(1 + 2 \log x)$$

44. Ans. b
Explanation:
Correlation coefficient is Independent of the units of measurement

45. Ans. b
Explanation:
The correlation between sale of cold drinks and day temperature is positive

46. Ans. c
Explanation:
If y = a + bx, then what is the coefficient of correlation between x and y -1

47. Ans. c
Explanation:
If the plotted points in a scatter diagram lie from upper left to lower right, then correlation is negative

48. Ans. a
Explanation:
Co-variance may be positive, negative or zero false

49. Ans. d
Explanation:
The difference between the observed value and the estimated value in regression analysis is known as error or residue

50. Ans. a
Explanation:

The two lines of regression meet at $(\bar{x}, \bar{y})$

51. Ans. a
Explanation:
$5x + 7y - 22 = 0$

$6x+2y-22=0$

$r=\sqrt{\frac{10}{42}}$

$byx=\frac{-5}{7}$

$bxy=-\frac{2}{6}$ $-\frac{5}{7}=-\frac{\sqrt{\frac{10}{42}}\times\sqrt{15}}{\sigma x}$ $\sigma x=2.64\ 6$

52. Ans. b
Explanation:
$byx=0.80$

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

$q=\frac{5}{-2}$

$byx=\frac{q}{p}xbuv$

$0.80=\frac{\frac{-5}{2}}{\frac{-1}{3}}\times buv$ $buv=0.1066$

53. Ans. b
Explanation:
$byx=\frac{r\times\sigma y}{\sigma x}$

$-\frac{3}{4}=-\frac{\sqrt{\frac{3}{2}}\times 2}{\sigma x}$

$\sigma x=\sqrt{\frac{16}{3}}$

$Vx=\frac{16}{3}$

54. Ans. a
Explanation:
$byx=\frac{0.92\times 6}{5}$ $bxy=\frac{0.92\times 5}{6}$

$byx+bxy=1.871$

55. Ans. b

Explanation:

$$p.E = \frac{0.6745 \times 1 - r^2}{\sqrt{n}}$$

$$0.2 = \frac{0.6745 \times (1 - r^2)}{3}$$

r = 0.332

56. Ans. c
Explanation:

$$\boldsymbol{P}(\boldsymbol{A} \cap \boldsymbol{B}) = 1 - \frac{5}{6} = \frac{1}{6}$$

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

$$\boldsymbol{P}(\boldsymbol{A} \cup \boldsymbol{B}) = \frac{1}{2} + \frac{1}{3} - \frac{1}{6} = \frac{2}{3}$$

57. Ans. a
Explanation:

$$(3,4)(4,3)\ (2,6)\ (6,2)$$

$$= \frac{4}{36}$$

58. Ans. d
Explanation:

$$\frac{5c_3}{12c_3} \times \frac{7c_3}{12c_3} = \frac{7}{968}$$

$$\frac{5c_3}{12c_3} \times \frac{7c_3}{12c_3} = \frac{5}{264}$$

59. Ans. c
Explanation:
Standard normal distribution have inflexion points – 1 & +1.

60. Ans. c
Explanation:

$$A = \frac{4}{5} \qquad A' = \frac{1}{5}$$

$$B = \frac{3}{4} \qquad B' = \frac{1}{4}$$

$$AB' + BA' = \frac{7}{20}$$

61. Ans. b
Explanation:

SM
MT
TW
WT 53 Saturday= $\frac{2}{7}$
TF
FS
SS

62. Ans. d
Explanation:
$E(x-\mu)^2$ *and* $E[x-E(x)]^2$ *both are known as* variance

63. Ans. b
Explanation:
$\beta(n,p)$ it is Biparametric and Parameters are n and p

64. Ans. d
Explanation:
$np=3$
$\sqrt{npq}=1.5$
$3q=2.25$
$q=\frac{2.25}{3}$ $q=0.75,\ p=0.75$ so n = 12

65. Ans. a
Explanation:
$np=4$
$npq=3$
$4q=3$
$q=\frac{3}{4}$ $p=\frac{1}{4}$ so n = 16
$\text{mod}\, e=(16+1)\frac{1}{4}=\frac{17}{4}=(4)$

66. Ans. a
Explanation:
${}^{10}c_5\left(\frac{1}{2}\right)^{10}$

67. Ans. b
Explanation:
Mean = $6\times\frac{1}{2}=3$

$$SD = \sqrt{6 \times \frac{1}{2} \times \frac{1}{2}} = 1.22$$

68. Ans. b
Explanation:

$$n\,p = \frac{10}{3}$$

$$2\,n_{c_2}\,p^2\,q^{n-2} = n_{c_3}\,p^3\,q^{n-3}$$

$$\frac{2 \times n!}{2!\,n-21}\,q = \frac{n!}{3!\,n-3!}\,p$$

$$\frac{q}{n-2} = \frac{p}{6}$$

$$6q = n\,p - 2\,p$$

$$6q = \frac{10}{3} - 2\,p$$

$$6q = \frac{10-6p}{3}$$

$$18q = 10 - 6\,p$$

$$18 - 18\,p = 10 - 6\,p$$

$$12p = 8$$

$$p = \frac{2}{3} \quad q = \frac{1}{3}$$

$$n \times \frac{2}{3} = \frac{10}{3}$$

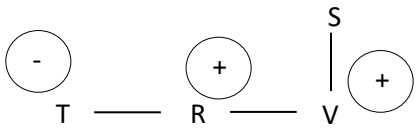
$$n = 5$$

$$5_{c_0}\left(\frac{2}{3}\right)^0\left(\frac{1}{3}\right)^5 + 5_{c_1}\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^4 + 5_{c_2}\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^3$$

$$\frac{1}{3^5} + 5 \times \frac{2}{3^5} + \frac{10 \times 4}{3^5}$$

$$\frac{1+10+40}{3^5} = \frac{51}{3^5} = \frac{51}{243} = \frac{17}{81}$$

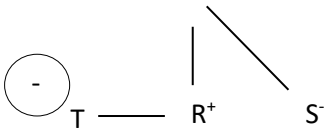
69. Ans. d
Explanation:



Daughter

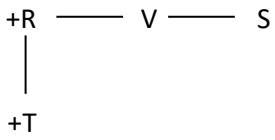
70. Ans. b
Explanation:

V



Sister

71. Ans. a
Explanation:



Aunt

72. Ans. d
Explanation:
XC

73. Ans. d
Explanation:
Second from Right

74. Ans. c
Explanation:
XA

75. Ans. a
Explanation:
One

76. Ans. b
Explanation:
B

77. Ans. a
Explanation:
South

78. Ans. d
Explanation:
R K

79. Ans. c
Explanation:
"The less than Ogive" is a S–shaped curve

80. Ans. d
Explanation:
Most of the commonly used frequency curves are Bell-shaped

81. Ans. b
Explanation:

Income Tax Central angle = $\frac{240}{720}\times 360=120$

Wealth Tax angle = $\frac{180}{720}\times 360=90$

82. Ans. a
Explanation:
The most appropriate diagram to represent 5 year plan outlay of India in different economic sectors is Pie diagram

83. Ans. c
Explanation:
The most stable measure of central tendency is mean

84. Ans. c
Explanation:

$$\sum\left(x-\bar{x}\right)^2 = Minimum$$

85. Ans. d
Explanation:
GM cannot be determined is data set have positive and negative observations

86. Ans. a
Explanation:

$$A.M.=\frac{6+8+12+36}{4}=15.5$$

$$G.M.=(6\times 8\times 12\times 36)^{1/4}=12$$

87. Ans. c
Explanation:

$$4x-6y=13$$

$$4\times 16-6y=13$$

$$64-13=6y$$

$$6y=51$$

$$y_m=\frac{51}{6}=8.5$$

88. Ans. a
Explanation:

$$Q_1=\frac{1(n+1)}{4}th \qquad D_6=\frac{6(n+1)}{10}th \qquad P_{82}=\frac{82(n+1)}{100}th$$

$= \frac{10+1}{4} th$ $\frac{6\,X\,11}{10} = 6.6\,th$ $\frac{82 \times 11}{100} th$

2.75 th item = 62.75 6.6 th item = 81.20 9.02 th item = 120.20

89. Ans. b
Explanation:
Mean – Mode = 3 (Mean – Median)
50 – x = 3 (50 – 40)
50 – x = 30
X = 20

90. Ans. d
Explanation:
$\sum n^2 = \frac{n(n+1)\ (2n+1)}{6}$
A.M. of first 2n natural number
$\frac{2n\ (2n+1)\ (4n+1)}{6 \times 2n}$
$= \frac{(2n+1)\ (4n+1)}{6}$

91. Ans. a
Explanation:
$\sigma x = 3$
$y = 5 - 2x$
$\sigma\ y = \frac{2}{1} \times 3 = 6$
$vy = 36$

92. Ans. c
Explanation:
$\sum dx^2 = 250$ $n = 10$
$\bar{x} = 50$
$\sigma = \sqrt{\frac{250}{10}} = 5$
$C.V. = \frac{5}{50} \times 100 = 10$

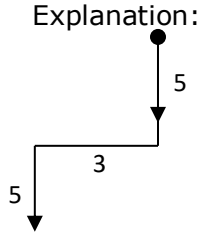
93. Ans. b
Explanation:
If the values of y are not affected by changes in the values of x, the variables are said to be Uncorrelated

94. Ans. c
Explanation:
$D = b^2-4ac$
$= (-8)^2–4(3)(4)$
$= 16$
If $D \geq 0$ and a perfect square then roots are real, rational and unequal.

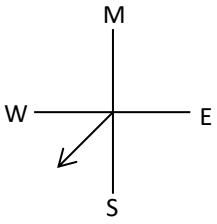
95. Ans. c
Explanation:
Product of extreme terms = product of mean terms
$(23 – x)(78 - x) = (30 - x)(57 - x)$
$x = 6$

96. Ans. d
Explanation:
No. of different ways can be failed $=2^4-1$

97. Ans. d
Explanation:

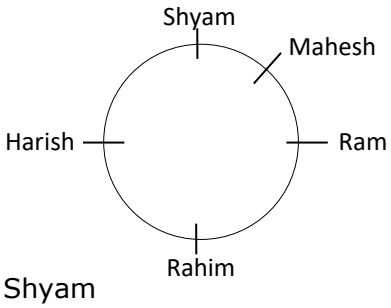


South-West



98. Ans. c
Explanation:
For dividing 12 into two whole nos. the sum of ratio must be a factor of 12. So they cannot be 3:2.

99. Ans. d
Explanation:



Shyam

100. Ans. b
Explanation:
Mahesh

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