GGSIPU mathmatics 2014

1. For integers m,n,s ≥ 0 $\sum_{k}^{n} {}^{-r+8}C_k \, {}^{n+r-s}C_{n-k} \, {}^{r+k}C_{m+n}$ is equal to

   a 0   b ${}^{n}C_m \, {}^{s}C_{\pi}$

   (c) ${}^{r}C_m \, {}^{s}C_n$ d ${}^{s}C_n \, {}^{m}C_r$

2. $\lim_{x\to\infty} \sin x$ is equal to

   a 0

   b ∞

   c exists is finite and non -zero

   d Does not exist

3. If x = a+b, y = $a\omega+b\omega^2$, z = $a\omega^2+b\omega$, then xyz equals to where, ω is the cube root of unity

   a a+b   b a^2+b^2

   c a^3+b^3 d a^4+b^4

4. $\lim_{n\to\infty}\left(\frac{2n^3}{2n^2+3}+\frac{1-5n^2}{5n+1}\right)$ is equal to

   a 0   b 1

   (c) 1/5   d ∞

5. $\lim_{x\to\frac{\pi}{6}}\frac{\sin\left(x-\frac{\pi}{6}\right)}{\sqrt{3}-2\cos x}$ is equal to

   a 0   b $\frac{1}{\sqrt{3}-2)}$

   (c) 1   d ∞

6. $\lim_{x\to\infty}\left(\frac{2x^2+3}{2x^2+5}\right)^{8x^2+3}$ is equal to

   a 0   b 1

   (c) e^{8} d e^{-8}

7. For y = $\frac{x}{x^2-1}$, $\frac{d^n y}{dx^n}$ is equal to

a $\frac{n!}{2}[\frac{1}{(x-1)^n}+\frac{1}{(x-1)^n}]$

b $\frac{(-1)^n n!}{2}[\frac{1}{(x+1)^n}-\frac{1}{(x-1)^n}]$

c $\frac{n!}{2}[\frac{1}{(x+1)^{n+1}}-\frac{1}{(x-1)^{n+1}}]$

d $\frac{(-1)^n n!}{2}[\frac{1}{(x+1)^{n+1}}-\frac{1}{(x-1)^{n+1}}]$

8. Find the slope of the normal to the curve $4x^3+6x^2-5xy-8y^2+9x+14 = 0$ T the point -2,3.

a ∞ b 11

(c) $\frac{9}{2}$ d $\frac{2}{9}$

9. $\lim_{x\to 0}\frac{\sin 3x^2}{Ln\cos(2x^2-x)}$ is equal to

a 0 b -6

(c) 1 (d) ∞

10. $\int_{-\pi/2}^{\pi/2}\cos x\ln\left(\frac{1+x}{1-x}\right)$dx is equal to

a 0 b $\frac{\pi^2}{4}\left(-1+\frac{\pi}{2}\right)$

(c) 1 d $\frac{\pi^2}{2}$

11. $\lim_{n\to\infty}\left(\frac{\sqrt[3]{n!}}{n}\right)$ is equal to

a 0 b 1

(c) -1 d e^{-1}

12. $\int_0^{\pi}\sqrt{\frac{1+\cos 2x}{2}}$ dx equals to

a 0 b 2 c 4 d -2

13. The quadrangle with the vertices A -3,5,6, B1, -5,7 ,C8, -3,-1 and D4,7, -2 is a

a square b rectangle

c parallelelogram d trapezoid

14. | a| =| b | = 5 and the angle between a and b is $\frac{\pi}{4}$, The area of the triangle constructed on the vectors a-2b and 3a+2b is

a 560 b 50 $\sqrt{2}$

c $\frac{50}{\sqrt{2}}$ d 100

15. In the triangle with vertices A1, -1,2, B5, -6,2 and C(3 -1 find the altitude n = | BD |.

a 5 b 10 c 5 $\sqrt{2}$ d $\frac{10}{\sqrt{2}}$

16. If $\frac{1}{b-a}+\frac{1}{b-c}=\frac{1}{a}+\frac{1}{c}$, then a,b and c are in

a AP b HP

c GP d Both b and c

17. Given lines

$L_1 : \frac{x}{-2}=\frac{y-1}{0}=\frac{z+2}{1}$

$L_2 : \frac{x+1}{0}=\frac{y+1}{2}=\frac{z-2}{-1}$

Find the distance between the given straight lines.

a 12 b $\frac{\sqrt{21}}{12}$ c $\frac{21}{\sqrt{12}}$ d $\frac{12}{\sqrt{21}}$

18. Compute the shortest distance between the circle $x^2+y^2-10x-14y-151 = 0$ and the point -7,2.

a 0 b 1 c 2 d 4

19. On the ellipse $9x^2+25y^2 = 225$, find the point the distancefrom which to the our focus F_1 is four times the distance to the other focus F_2,

a $(-15,\sqrt{63})$ ($\left(\frac{-15}{4},\frac{\sqrt{63}}{2}\right)$

c $\left(\frac{-15}{4},\frac{\sqrt{63}}{4}\right)$ d $\left(\frac{-15}{2},\frac{\sqrt{63}}{2}\right)$

20. On the parabola $y^2 = 64x$, find the point nearest to the straight line 4x+3y-14 = 0.

a -24,9 b 9,12

c -9,24 d 9, -24

21. The determinant $\begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix}$ is divisible by

a $x - y$ b x^2-y^2+xy

c x^2+xy+y^2 d x^2-xy+y^2

22. The curve $5x^2+12xy-22x-12y-19 = 0$ is

a ellipse b parabola

c hyperbola d parallel straight lines

23. The derivative of $y = x^{2^x}$ w.r.t. x is

a $x^{2^x}2^x\left(\frac{1}{x} + In\,x\,In\,2\right)$ (b $x^{2^x}\left(\frac{1}{x} + In\,x\,In\,2\right)$

c $x^{2^x}2^x\left(\frac{1}{x} + In\,x\right)$ d $x^{2^x}2^x\left(\frac{1}{x} + \frac{In\,x}{In\,2}\right)$

24. $\lim_{x\to\frac{\pi}{2}}(\pi - 2x)^{\cos x}$ is equal to

a 0 b 1 c e d e^{-1}

25. $\int_0^1 x\,tan^{-1}x\,dx$ is equal to

a $\frac{\pi}{4}$ b $\frac{\pi}{4}+\frac{1}{2}$

c $\frac{\pi}{4}-\frac{1}{2}$ d $\frac{1}{2}$

26. $\int_0^{\pi/3}\frac{\cos\theta}{5-4\sin\theta}\,d\theta$ equal to

a $\frac{1}{4}\log\left(\frac{5}{5+2\sqrt{3}}\right)$ (b $\frac{1}{4}\log\left(\frac{5}{5-2\sqrt{3}}\right)$

c $\frac{1}{4}\log\left(\frac{5+2\sqrt{3}}{5}\right)$ (d $\frac{1}{4}\log\left(\frac{5-2\sqrt{3}}{5}\right)$

27. $\int\frac{x\,dx}{(1+x)^{3/2}}$ is equals to

a $2\frac{(2+x)}{\sqrt{1+x}}+C$ b $\frac{(2+x)}{\sqrt{1+x}}+C$

c $\frac{3}{2}\frac{x}{\sqrt{1+x}}+C$ d $\frac{3}{2}\frac{(2+x)}{\sqrt{1+x}}+C$

28. $\int a^x\,dx$ is equal to

a $\frac{a^x}{x\log a}$ + C b $a^x\log a$ + C

(c) $\frac{a^x}{\log a}$ + C d $\frac{xa^x}{\log a}$ + C

29. $\int_{-\pi}^{\pi}(\cos px - \sin qx)^2$ dx, where p and q are integers, is equal to

a -π b 0

c π d 2 π

30. The solution of the differential equation $x^2-y^2dx + 2xy\ dy = 0$, is

a $x^2-y^2 = Cx$ b $x^2-y^2 = Cy$

c $x^2+y^2 = Cx$ d $x^2-y^2 = Cy$

31. The solution of the differential equation $\frac{d^2y}{dx^2}$ + 3y = -2x is

a $c_1\cos\sqrt{3x}+ c_2\sin\sqrt{3x}- \frac{2}{3}x^2$

b $c_1\cos\sqrt{3x}+ c_2\sin\sqrt{3x}- \frac{4}{5}$

c $c_1\cos\sqrt{3x}+ c_2\sin\sqrt{3x}- 2x^2+\frac{4}{9}$

d $c_1\cos\sqrt{3x}+ c_2\sin\sqrt{3x}- \frac{2}{3}x^2+\frac{4}{9}$

32. Angles A, B, C of a ΔABC are in AP and b:c = $\sqrt{3}+\sqrt{2}$, then the ∠A is given by

a 45^0 b 60^0

c 75^0 d 90^0

33. The angle between the vectors a = $\hat{\imath} + 2\hat{\jmath} + 2\hat{k}$ and b =$\hat{\imath} - 2\hat{\jmath} + 2\hat{k}$ is

a $\sin^{-1}1/9$ b $\cos^{-1}8/9$

c $\sin^{-1}(8/9$ d (d) $\cos^{-1}(1/9$

34. The straight line r = $\hat{\imath} - \hat{\jmath} + \hat{k}$+ λ $2\hat{\imath} + \hat{\jmath} - \hat{k}$ = 4 are

a perpendicular to each other

b parallel

c inclined at an angle 60^0

d inclined at an angle 45^0

35. If two cards are drawn simultaneously from the same set, the probability that atleast one of them will be the ace of hearts is

a $\frac{1}{13}$ b $\frac{1}{26}$ c $\frac{1}{52}$ d $\frac{3}{13}$

36. In a class there are 10 boys and 8 girls. When 3 students are selected at random, the probability that 2 girls and 1 boy are selected is

a $\frac{35}{102}$ b $\frac{15}{102}$

c $\frac{55}{102}$ d $\frac{25}{102}$

37. If M and N are any two events, the probability that exactly one of them occurs is for an event set A, the complement is A^0

a PM + PN – 2PM ∪ N

b PM + PN – PM ∪ N

c $PM^0 + PN^0 - 2PM^0 \cup N^0$

d $PM \cup N^0 + PM^0 \cup N$

38. If three squares are chosen an a chess board, the chance that they should be in a diagonal line is

a $\frac{7}{144}$ b $\frac{5}{744}$

(c) $\frac{7}{544}$ d $\frac{11}{744}$

39. Let A = $\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$, then

a $A^2+7A-5/ = 0$ b $A^2-7A+5/ = 0$

c $A^2+5A-7/ = 0$ d $A^2-5A+7/ = 0$

40. $\int_0^1 \frac{dx}{1+x+x^2}$ is equal to

a $\frac{\pi}{\sqrt{3}}$ b $\frac{\pi}{2\sqrt{3}}$ c $\frac{2\pi}{3\sqrt{3}}$ d $\frac{\pi}{3\sqrt{3}}$

41. A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product. A and 420 consumers like product B. Then, the least number of consumers that must have liked both the products is

a 170 b 180 c 210 d 190

42. The polar form of complex number z = $\frac{i-1}{\cos\frac{\pi}{3}+ i\sin\frac{\pi}{3}}$ is

X	5	2	1	4	3
Y	5	8	4	2	10

a $\frac{1}{\sqrt{2}}\left(\cos\frac{3\pi}{12} + i\sin\frac{3\pi}{12}\right)$

b $\sqrt{2}\left(\cos\frac{5\pi}{12} + i\sin\frac{5\pi}{12}\right)$

c $\sqrt{2}\left(\cos\frac{7\pi}{12} + i\sin\frac{7\pi}{12}\right)$

d $\frac{1}{\sqrt{2}}\left(\cos\frac{5\pi}{12} + i\sin\frac{5\pi}{12}\right)$

43. The equation of the plane passing through the points 2,2,1, 9,3,6 and perpendicular to the plane 2x+6y+6z = 1 is

a 2x-4y+5z-9 = 0 b 3x+4y -z-5 = 0

c 3x+4y -5z-9 = 0 d x+4y -9z-3 = 0

44. The line of regression of y on x for the following data

Is given by

a Y+0.4x = 1 b y+ 0.5x = 5

c y+0.4x = 7 d y+1.4x = 7

45. The measure of the chord intercepted by circle $x^2+y^2 = 9$ and the line x-y+2 = 0 is

a $\sqrt{28}$ b 2 $\sqrt{5}$

c 7 d 5

46. $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ equals to

a 0 b 2 $\sqrt{3}$ c $-\frac{\pi}{2}$ d π

47. The sum of the deviations of the variates from the arithmetic mean is always

a +1 b 0

c -1 d real number

48. A single letter is selected at random from the word "PROBABILITY". The probability that it is a vowel is

a $\frac{8}{11}$ b $\frac{4}{11}$

c $\frac{2}{11}$ d $\frac{3}{11}$

49. An object is observed from three points A,B and C in the same horizontal line passing through the base of the object. The angle of elevation at B is twice and at C thrice that at A. If AB = a, BC = b, then the height of the object is

a $\frac{a}{2b}\sqrt{(a+b\ (3b-a}$

b $\frac{a}{2b}\sqrt{(a-b)\ 3b-a)}$

c $\frac{a}{2b}\sqrt{(a-b\ \ 3b+a}$

d $\frac{a}{2b}\sqrt{(a+b\ \ 3b+a}$

50. The angle between the lines whose direction ratios are 1,1,2, $\sqrt{3}$-1, -$\sqrt{3}$-1,4 is

a cos $^{-1}\left(\frac{1}{65}\right)$ b $\frac{\pi}{6}$

c $\frac{\pi}{3}$ d $\frac{\pi}{2}$