

GATE General Aptitude

1. If the product of the two numbers is 165 and the Sum is 26. Then find out difference between two numbers
(a)3
(b)5
(c)8
(d)6
2. For How much hour does P stays in his office if his hand clock moves 225 degree
(a)7.5
(b)8
(c)8.5
(d)8
3. Minister was asked about the reservation for the women in private sector, but he kept _____ the issue
(A)dodging
(b)skirting
(c)declining
(d)asserting
4. Sir John who was _____ poet, and he died in 2002
(a) Eminent
(b) Impressive
(c) Superb
(d) Highly Qualified
5. A person has invested 1,00,000 Rs. In two places. From one place he gets 10 % profit and from other place he gets 12 % profit. If the profit percentage changes between two places, then the difference in profit becomes 162 Rs. Find out the ratio between two investments _____ Answer – 43/57
6. M and N has total four children P, Q, R and S . Only P and R are married and they have children X and Y respectively. If Y is the child of W, which one of the following should be definitely wrong?
(A) W is wife of P
(b) W is wife of R
(c) M is married to N
(d) X is son of P

Solutions

$$1) \quad a + b = 165$$

$$a \times b = 26$$

$$a - b = \sqrt{(a+b)^2 - 4ab}$$

$$= \sqrt{16}$$

$$\boxed{a - b = \pm 4}$$

Difference is 4

$$2) \quad 360^\circ \text{ rotation for } \text{---} \quad 12 \text{ hours}$$

$$1^\circ \text{ ---} \quad \frac{12}{360} \text{ hours}$$

$$225^\circ \text{ ---} \quad \frac{12}{360} \times 225 = 7.5 \text{ Ans}$$

3) skirting

4) Eminent

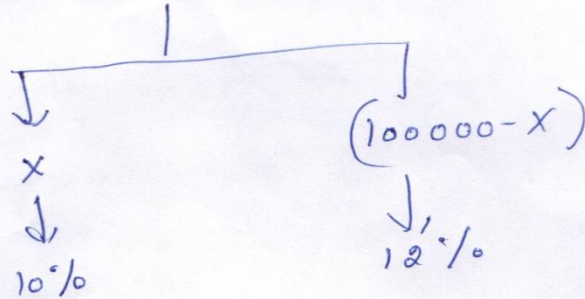
$$5) \quad a \times b = 165$$

$$a + b = 26$$

$$a - b = \sqrt{(a+b)^2 - 4ab} = \sqrt{256}$$

$$\boxed{a - b = 4}$$

5] Let the investment is x



$$\text{profit} = x \times \frac{10}{100} + (100000 - x) \times \frac{12}{100} \quad \text{--- (1)}$$

on interchanging profits

$$\text{profit}_2 = (100000 - x) \times \frac{10}{100} + x \times \frac{12}{100} \quad \text{--- (2)}$$

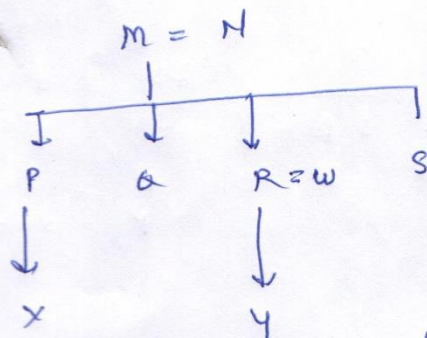
$$\text{equ (1) - equ (2) = 162}$$

$$x = 43,000$$

$$y = 57000$$

$$\text{Ratio} = \frac{43}{57}$$

8]



w is wife of P → this statement will be false ^{anyway} ~~at least~~ because w is married to R

GATE Mathematics (GATE ME – 2 Feb'2019 Morning Session)

1. If a function satisfies Laplace equation, then the harmonic function is analytic. If $u(x,y)=A = 2x^2 - 2y^2 + 4xy$ is a harmonic function, then its conjugate harmonic function $v(x, y)$ is
 - (a) $4x^2 - 2y^2 + 4xy$
 - (b) $28 - 2y^2 + 4xy$
 - (c) $-2x^2 + 2y^2 + 4xy + c$
 - (d) $2x^2 - 2y^2 + 4xy$

2. The length of large stocks follows normal distribution with mean 440 mm and standard deviation of 1 mm. Find out the percentage of rods whose length lies between 438 mm and 441 mm?
 - (a) 51.8%
 - (b) 81.8%
 - (c) 71.8%
 - (d) 61.8%

3. The variable X follows a uniform probability distribution with value between 0 & 10 and the variable Y follows a uniform probability distribution with value between 0 & 20. Find out the probability of the sum of variables X+Y greater than 20 is
 - (e) 1/2
 - (f) 1/4
 - (g) 1/5
 - (h) 1/6

4. Find out the Integral Value of $\int_1^e x \ln(x) dx$ _____

5. A Parabolic with equation $x = y^2$ with $0 \leq x \leq 1$. Find out the volume obtained by solid by rotating the parabola area of the x – axis about 360 degree
 - (a) π
 - (b) $\pi/2$
 - (c) $\pi/4$
 - (d) 2π

6. $\frac{dy}{dx} + 7x^2y = 0$ and the initial condition $y(0) = 3/7$. Find out the value of $y(1)$
 - (e) π
 - (f) $\pi/2$
 - (g) $\pi/4$
 - (h) 2π

7. Find out the integral value of $\int_2^4 x^3 dx$ by the trapezoidal rule for 2 equal interval _____

8. A matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ Find out the distinct Eigen values for Matrix A
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3

$$\textcircled{1} \quad u(x, y) = 2x^2 - 2y^2 + 4xy$$

$$u_x = 4x + 4y$$

this should be equal to v_y for harmonic

$$v_y \text{ for option 3} = \frac{dv}{dy} = 4y + 4x$$

$$u_x = v_y \text{ for option c.}$$

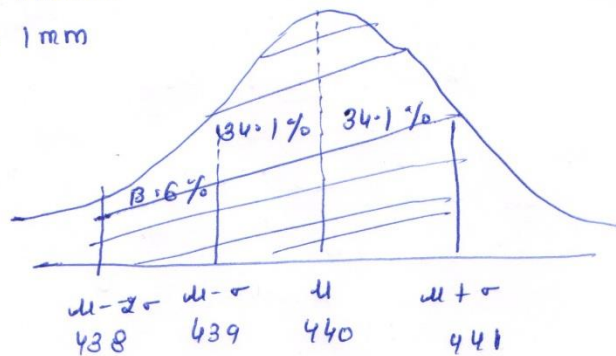
So option (c) $[-2x^2 + 2y^2 + 4xy + c]$ is right

Answer

②

$$\mu = 440 \text{ mm}$$

$$\sigma = 1 \text{ mm}$$



$$P[438 < x < 441] =$$

$$438 = 440 - 2 = \mu - 2\sigma$$

$$441 = 440 + 1 = \mu + \sigma$$

$$\text{total volume} = 34.1\% + 34.1\% + 13.6\%$$

$$= 68.2 + 13.6$$

$$\boxed{\text{total volume} = 81.8\%}$$

3 →

[Pdf for uniformly distributed function]

$$f(x) = \frac{1}{b-a} \quad \text{for uniform distribution}$$

for R.V. X $f(x) = \frac{1}{10-0} = \frac{1}{10}$

for R.V. Y $f(y) = \frac{1}{20-0} = \frac{1}{20}$

$$\begin{aligned}
 P[x+y > 20] &= \int_0^{10} \int_{20-x}^x f(x, y) dy dx \\
 &= \int_0^{10} \int_{20-x}^x f(x) \cdot f(y) dy dx \\
 &= \int_0^{10} \int_{20-x}^x \frac{1}{10} \cdot \frac{1}{20} dy dx \\
 &= \frac{1}{4}
 \end{aligned}$$

$$4) \int_1^e x \ln x \, dx$$

ILATE \rightarrow log(first)

$$\int_1^e (\ln x \cdot x) \, dx = \ln x \int x \, dx - \int \frac{d(\ln x)}{dx} \int x \, dx$$

$$= \ln x \cdot \frac{x^2}{2} - \int \frac{1}{x} \cdot \frac{x^2}{2} \, dx$$

$$= \left[\ln x \cdot \frac{x^2}{2} - \frac{x^2}{4} \right]_1^e$$

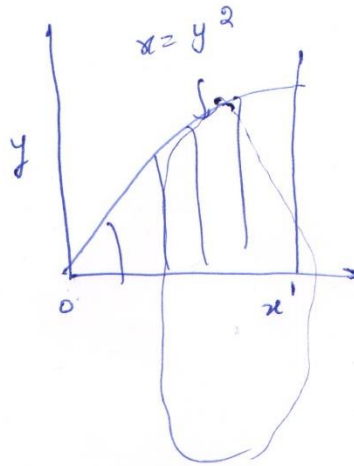
$$= \left[\ln e \cdot \frac{e^2}{2} - \frac{e^2}{4} \right] - \left[\ln 1 \cdot \frac{1}{2} - \frac{1}{4} \right]$$

$$= \frac{e^2}{2} - \frac{e^2}{4} + \frac{1}{4}$$

$$= \frac{e^2}{4} + \frac{1}{4} = 2.087$$

5 →

$$x = y^2$$



$$\begin{aligned}
 V &= \int \text{Area of circle with radius } x \\
 &= \int_0^1 \pi (y^2) dx \\
 &= \int_0^1 \pi x dx \\
 &= \pi \left[\frac{x^2}{2} \right]_0^1 \\
 &= \frac{\pi}{2}
 \end{aligned}$$

$$\begin{aligned}
 6 \rightarrow \frac{dy}{dx} + 7x^2y &= 0 \\
 y(0) &= 3/7
 \end{aligned}$$

Answer $y = \frac{3}{7} e^{-7/3}$

$$\frac{dy}{dx} = -7x^2y$$

$$\frac{dy}{y} = -7x^2 dx$$

$$\ln y = \frac{-7x^3}{3} + c$$

$y = k e^{-\frac{7x^3}{3}}$

$$\begin{aligned}
 y(0) &= 3/7 \quad \& \quad k = 3/7 \\
 \& \quad y(1) &= \frac{3}{7} e^{-7/3}
 \end{aligned}$$

7)

$$\int_2^4 x^3 dx$$

x	2	3	4
y	8	27	64

$$n = \frac{b-a}{h}$$

$$h = \frac{b-a}{n} = \frac{4-2}{2} = \frac{2}{2} = 1$$

$$\int_2^4 x^3 dx = \frac{1}{2} [(64+8) + 2 \times 27]$$

$$= \frac{1}{2} [72 + 2 \times 27]$$

$$= 63$$

8)

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

How many distinct eigen values are there for the matrix A.

(a) 0

(b) 3

(c) 1

(d) 2

Answer

A is upper triangular matrix. The eigen values will be principle diagonal values.

$$\lambda_1 = \lambda_2 = \lambda_3 = 1$$

So number of distinct eigen values are only ~~one~~
zero.