

SURNAME

OTHER NAMES

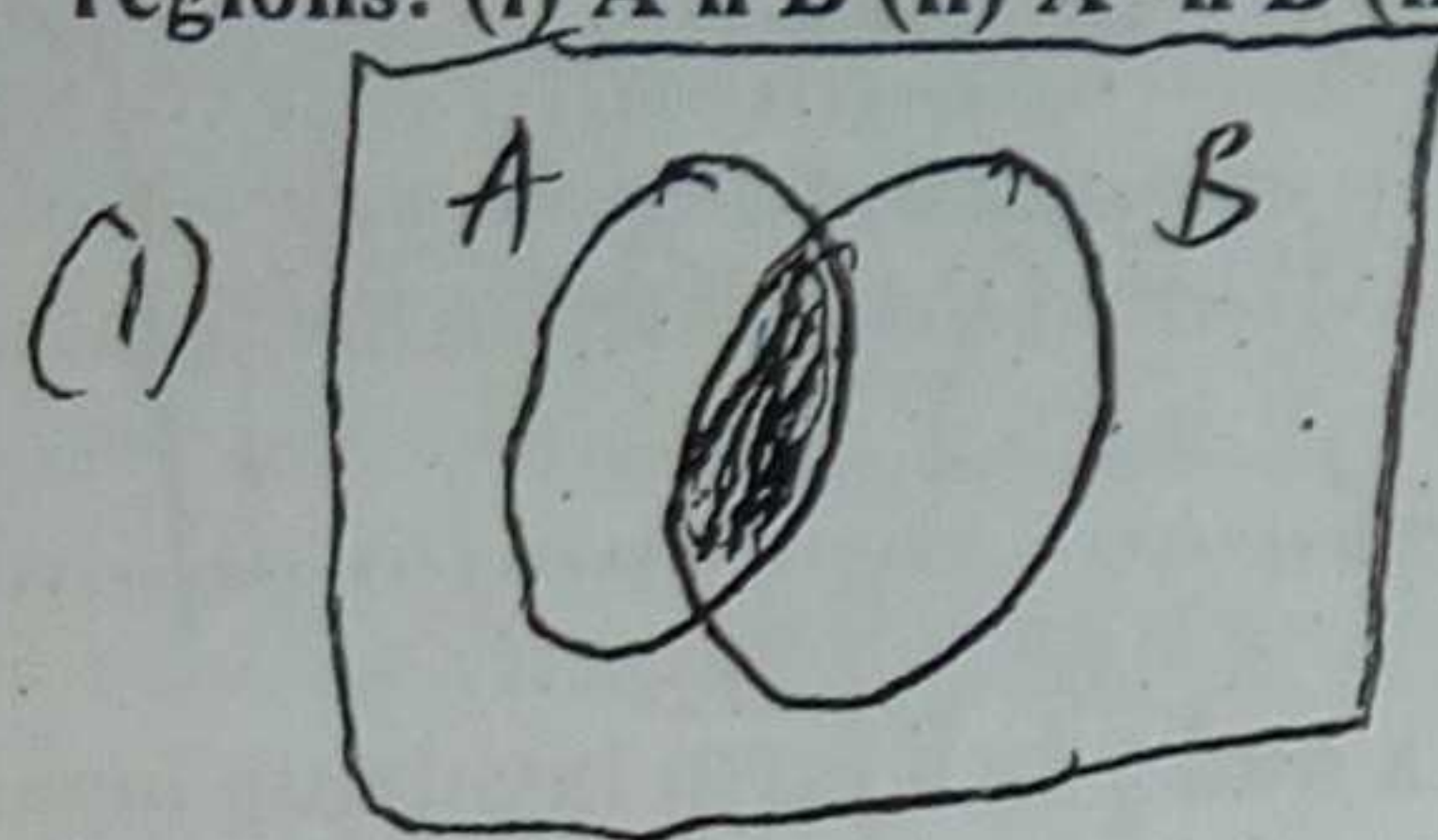
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DEPARTMENT OF MATHEMATICAL SCIENCES

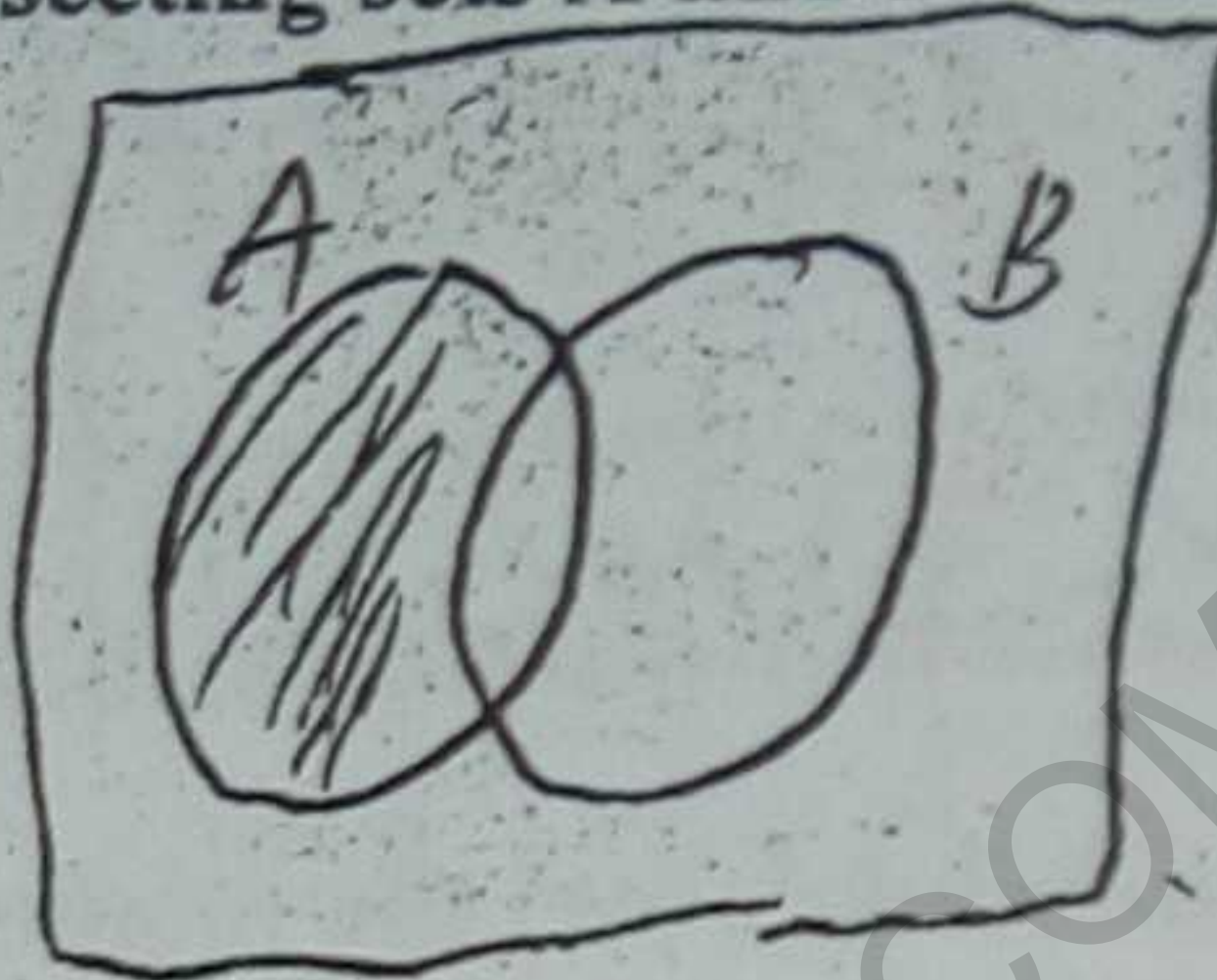
MAT 101

2010/2011

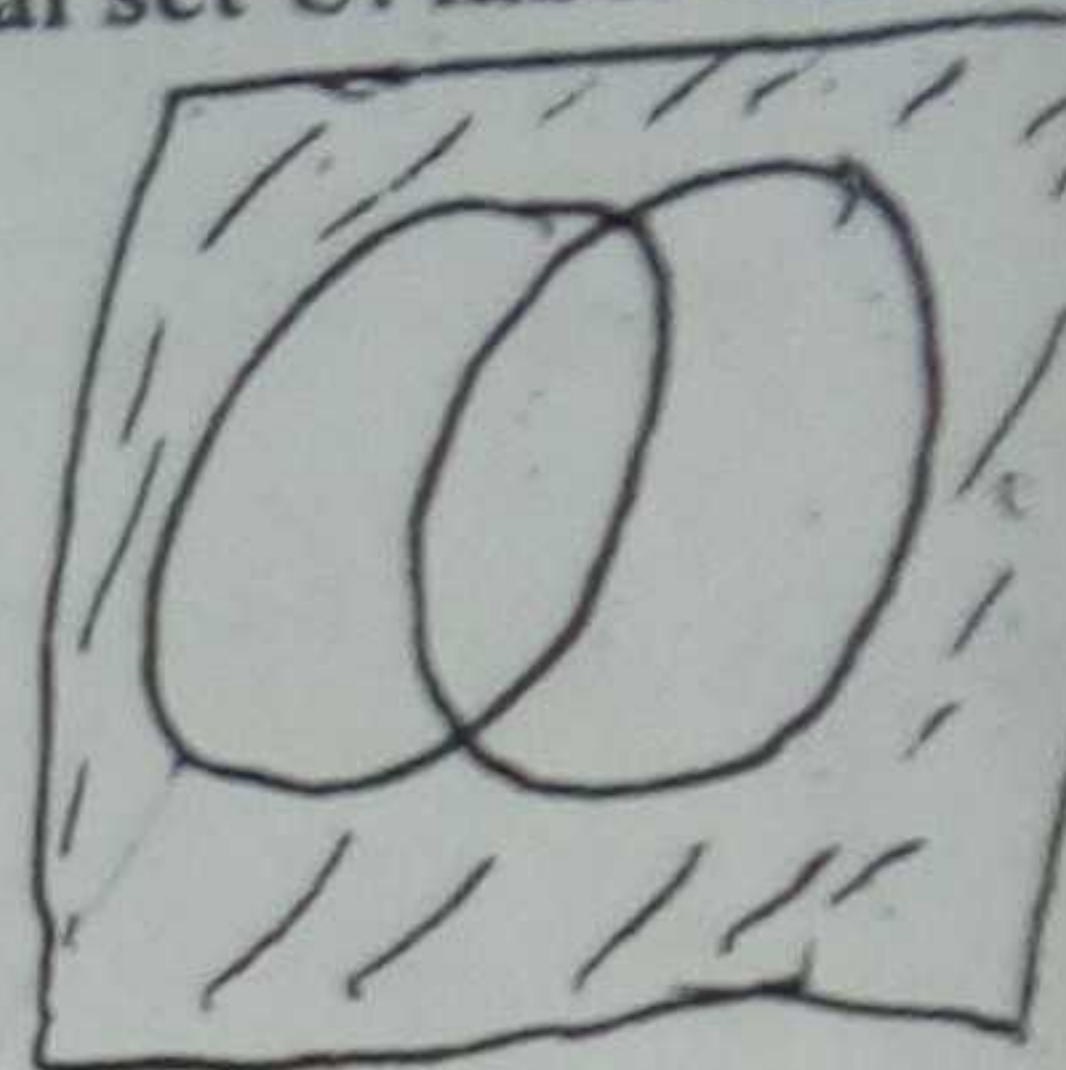
1. Draw a Venn Diagram to show two intersecting sets A and B in the universal set U. label the regions: (i) $A \cap B$ (ii) $A' \cap B$ (iii) $A - B$



(ii)



(iii)



2. Simplify $\frac{5x}{x^2-9} \times \frac{2}{3-x}$

$$\frac{5x(3-x) - 2(x^2-9)}{(x-3)(x+3)(3-x)} = \frac{15x - 5x^2 - 2x^2 + 18}{(x-3)(x+3)(3-x)}$$

$$= \frac{-7x^2 + 15x + 18}{(x-3)(x+3)(3-x)}$$

3. Machine A can do a job in 10hrs, Machine B can do the same job in 8hrs. How many hours will the job take if both machines work at the same time.

Machine A = 10hrs
Machine B = 8hrs

Time for both Machines (A & B) = $\frac{10hrs + 8hrs}{2} = 9hrs$

4. Find the sum of all the numbers less than 100 whose last digit is 5.

$$5 + 15 + 25 + 35 + 45 + 55 + 65 + 75 + 85 + 95$$

$$= \underline{\underline{500}}$$

or $S_n = \frac{n}{2} [a + L]$

$$S_{10} = \frac{10}{2} [5 + 95] = \underline{\underline{500}}$$

5. When a ball is dropped on to level ground it always rebounds to a height of 0.9 times the height from which it fell. If it is dropped from a height of 10 metres, calculate the height to which it rebounds after eight bounces.

Dropped height = 10m
 For 1st 1 rebound height = $0.9 \times \text{Dropped height} = 0.9 \times 10 = 9\text{m}$
 For 8 rebounds = $9\text{m} \times 8 = \underline{\underline{72\text{m}}}$

6. Write $2x^2 - 4x + 5$ in the form $a(x + b)^2 + c$

$$\underline{\underline{2(x-1)^2 + 3}}$$

7. Find the value of p for which the equation $(p+1)x^2 + 4px + 9 = 0$ has equal roots.

For equal root $D=0$

1. $b^2 = 4ac$

$$(4p)^2 = 4(p+1)(9)$$

$$16p^2 = 36p + 36$$

$$\begin{array}{l} 16p^2 - 36p - 36 = 0 \\ \text{using quadratic eqn} \\ p = \frac{7 \pm 15}{8} \quad \text{or} \quad \frac{9-15}{8} \end{array}$$

$$p = 3 \text{ or } -3/4$$

8. A large sheet of paper is 0.04mm thick. How thick is it after it has been folded ten times.

$$10 \times 0.04\text{mm} = \underline{\underline{0.4\text{mm}}}$$

9. Simplify $\frac{3(2^{n+1}) - 4(2^{n-1})}{2^{n+1} - 2^n}$

$$\frac{3(2^{n+1}) - 4(2^{n-1})}{2^{n+1} - 2^n} = \underline{\underline{4}}$$

check no 11, 2009/2010 for solution

10. For what value of x is $3x^2 - x + 1 < x + 2$?

check no 6, 2009/2010 for solution

$$-1/3 \text{ or } 1$$

11. The sum of the first eight terms of an A.P is 60 and the sum of the next eight terms is 120. Find the first term.

Check no 25, 2009/2010
Solution

12. The roots of the equation $px^2 + qx + 4 = 0$ are α and β . Find in terms of p and q the value of $\alpha^2 + \beta^2$.

Check no 11, 2007/2008
Solution

13. Solve for x , given $9^x - 4(3^x) + 3 = 0$

Check no 1, 2009/2010
Solution

14. Expand $(1 + x + x^2)^3$ in power of x

Check 2(c), 2005/2006
For solution