the three right angle triangles T_1 with side 3, 4, 5 T_2 with sides 5, 12, 13 and T_3 with sides 6, 8, 10. Which triangles among T_1, T_2 and T_3 are realted?

Q8. State whether the given function is one-one, onto or bijective: $f : R \to R$ defined by .

Q9. Let * be a binary operation on set R. Find whether * is commutative and associative:

Q10. If $Sin^{-1}(1-x) - 2\,Sin^{-1}x = \frac{\pi}{2}$, *find* x

Q11. Using elementary tranformations find the inverse of $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$

Q12. Find the values of K, so that function f is continuous at the indicated point

$$f(x) = \begin{cases} \dfrac{K\cos x}{\pi - 2x}, & if \quad x \neq \pi/2 \\ 3, & if \quad x = \dfrac{\pi}{2} \end{cases} \qquad at \quad x = \pi/2$$

Q13. An ege of variable cube is increasing at the rate of 3cm/s. How fast is the volume of the cube increasing, when the edge is 10cm long?

Q14. Find the interuals in which function $f(x) = 4x^3 - 6x^2 - 72x + 30$ is
(a) strictly increasing (b) strictly decreasing

Q15. Use differential to approximate $\sqrt{36.6}$

Q16. Differentiate w.r.t. x : $\left(x + \frac{1}{x}\right)^x + (x)^{1+\frac{1}{x}}$

Q17. Use properties of determinants to prove

$$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1 - x^3)^2$$

Q18. Usint vector, find the area of ΔABC with vertices

Q19. Three vectors satisfy the condition . Evaluate the quantity if

Section - C

[illegible] $C\left(4, \frac{63}{16}, -1\right) = \pi$

Q21. The cost of 4kg onion, 3kg wheat and 2kg rice is Rs. 60. The cost of 2kg onion, 4kg wheat and 6kg rice is Rs. 90. The cost of 6kg onion, 2kg wheat and 3kg rice is Rs. 70. Find the cost of each item per kg by matrix method.

Q22. If $(x-a)^2 + (y-b)^2 = c^2$, for some $c > 0$, Prove that

Q23. Find the equations of the tangent and normal to the given curve at indicated point.

$y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at $(1,\ 3)$

Q24. Show that the semi-vertical angle of the cone of the maximum volume and of given slant height is , $\tan^{-1}\sqrt{2}$.

Q25. Let $\vec{a} = \hat{i} - \hat{j},\ \vec{b} = 3\hat{j} - \hat{k},\ and\ \vec{c} = 7\hat{i} - \hat{k},$ find a vector which is perpendicular to both and and .

Q26. An aeroplane can carry a maximum of 200 passengers. A profit of Rs. 1000 is made on each executive class ticket and profit of Rs. 600 is made on each economy class ticekt. The airline reserves atleast 20 seats for executive calss. However atleast 4 times as many passengers prefer to travel by economy class than by the executive class. Determine how many tickets of each type must be sold in order to maximize the profit for the airline. What is maximum profit?

Budha Dal Public School Patiala (28 Sept. 14)

UNIT-I

Class-XII (SET - B)

(Non-Med, Comm, Hum)

Mathematics

Time: 3 hrs. **Marks: 100**

Note: All Questions are compulsory

2) Q 1 to 6 carry 1 mark each.

3) Q 7 to 19 carry 4 marks each.

4) Q 20 to 26 carry 6 marks each.

SECTION - A

Q1. Find the number of all one-one functions from set $A = \{1,\ 2,\ 3\}$ to itself.

Q2. Find the principal value of $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

R and $\{(T_1, T_2), (T_2, T_1)\}$ where T_1 is similar to T_2

$\vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$

Q3. Find values of x, *if* $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$

Q4. Find $\frac{dx}{dy}$ *if* $y = Sin\ (\tan^{-1} e^x)$

Q5. The total cost C(x) in Rupees, associated with the production of x units of an item is given by $C(x) = 0.005x^3 - 0.02x^2 + 30x + 5000$. Find the marginal cost, when $x = 3$ untis.

Q6. find the projection of and .

Section - B

Q7. Show that relation R defined in the set A of all triangles as is an equivalence relation. Consider

Q8. State wether the function is one-one, onto or bijective: defined by .

Q9. Let * be a binary operation on the set Q of rational numbers. Find whether * is commutative and associative: $a * b = \frac{ab}{4}$

Q10. Solve: $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1} x,\ (x > 0)$

Q11. Using elementary operations, find the inverse of the matrix $A = \begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$

Q12. if $f(x) = \begin{cases} \frac{1-\cos kx}{x \sin x}, & x \neq 0 \\ \frac{1}{2}, & x = 0 \end{cases}$ *is continuous at* $x = 0$, *find* k

Q13. A particle moves along the curve $6y = x^3 + 2$. Find the points on the curve at which y-coordinate is changing 8 times as fast as the x-coordinate.

Q14. Find the intervals in which the function $f(x) = 2x^3 - 3x^2 - 36x + 7$ is

(a) strictly increasing (b) strictly decreasing

Q15. Use differential to approximate $(25)^{1/3}$.

Q16. *If* $x = \sqrt{a^{\sin^{-1} t}}$, $y = \sqrt{a^{\cos^{-1} t}}$ show that $\frac{dy}{dx} = -\frac{y}{x}$

Q17. Using properties of determinants:

Prove that: $\begin{bmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{bmatrix} = 4\ abc$

Q18. Using vectors, find the area of triangle with vertices

A (1, 1, 2), B (2, 3, 5), C (1, 5, 5)

Q19. Let $\vec{a}, \vec{b}$ *and* $\vec{c}$ three vectors such that and each one of them being perpendicular to the sum of the other two 1 find .

Section - C

Q20. Show that $\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$

Q21. The sum of three number is 6. If we multiply third number by 3 and add second number to it, we get 11. By adding first and third numbers, we get double of the second number. Represent it algebracally and find the numbers using matrix method.

Q22. Find $\frac{dy}{dx}$, *if* $y^x + x^y + x^x + x^a = a^b$

Q23. Find the equations of the tangents and normal to the given curves at the indicated points.

$y = x^4 - 6x^3 + 13x^2 - 10x + 5$ *at* (0, 5)

Q24. Show that the height of a cylinder, which is open at the top, having a given surface area and greatest volume, is equal to the radius of its base.

Q25. The scalar product of the vector $\hat{i}+\hat{j}+\hat{k}$ with unit vector along the sum of vectors $2\hat{i}+4\hat{j}-5\hat{k}$ and $\lambda\hat{i}+2\hat{j}+3\hat{k}$ is equal to one. Find the value of λ.

Q26. One kind of cake requires 200g of flour, 25g of fat and another kind of cake repuires 100g of flour and 50g of fat. Find the maximum number of cakes which can be made from 5kg of flour and 1kg of fat assuming that there is no shortage of the other ingredients, used in making cakes.

Budha Dal Public School Patiala (28 Sept. 15)

UNIT-I

Class-XII (SET - A)

(Non-Med, Comm, Hum)

Mathematics

Time: 3 hrs. **Marks: 100**

Note: All Questions are compulsory

2) Q 1 to 6 carry 1 mark each.

3) Q 7 to 19 carry 4 marks each.

4) Q 20 to 26 carry 6 marks each.

SECTION - A

Q1. Find the number of binary operations ofn the set $\{a, b\}$.

Q2. Find the principle value of $Sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$.

Q3. If a matrix has 8 elements, what are possible orders it can have?

Q4. Find $\frac{dy}{dx}$ if $y=2\sqrt{\cot(x^2)}$

Q5. The total revenue in Rupees received from the sale of x units of a product is given by $R(x)=3x^2+36x+5$. Find the marginel value, when $x=15$.

Q6. If is a unit vector of than find .

Section - B

Q7. Show that the relation R defined in the set A of all polygons on have same no. of sides, is a equivalence relation. What is the set of all elements in A related to the right angle triangle T with sides 3, 4 and 5?