Mathematics XII

Topic

Rate of change , Tangent & Normal

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Rate of change of quantities

Q. No. 1

A balloon which remains spherical has a variable radius. Find the rate at which volume is increasing with the radius when the latter is 10 cms.

Q.No.2

The radius of circle is increasing uniformly at the rate of 4 cms per second. Find the rate at which the area of the circle is increasing when the radius is 8 cms.

Rate of change of quantities

Q. No. 1

The radius of a spherical soap bubble is increasing at the rate of 0.3 cm/s. Find the rate of change of its (i) volume (ii) surface area , when radius is 8 cms.

Q.No. 2

A ladder 5 m long is leaning against a wall. The bottom of the ladder is pulled along the ground away from the wall at the rate of 2 m/s. How fast the height of ladder is deceasing when the foot of ladder is 4 m away from the wall.

Rate of change of quantities

Q. No.1.

A man of height 2 m walks at a uniform speed of 5 km/h away from a lamp post which is 6 m high. Find the rate at which the length of his shadow increases.

Q.No. 2

The length of a rectangle is decreasing at the rate of 3 cm/min and the width y is increasing at the rate of 2 cm/min.When x =10cms and y=6 cms , find the rate of change of (i) the perimeter (ii) the area of rectangle

Tangents and Normals

Q.No. 1.

Find the equation of tangent to the ellipse

$X^2/a^2+y^2/b^2=1$ at (x_1,y_1).

Q. No.2

Find the equation of tangent line to the curve $x= \theta+\sin\theta$, $y= 1+\cos\theta$ at $\theta =\pi/4$

Tangents and Normals

Q. No. 1

Find the equation of tangent and normal to the curve at given point.

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

Q. No. 2

Find the point on the curve $y=3x^2-12x+6$ at which tangent is parallel to x-axis. Also find the equation of tangent.

Tangents and Normals

Q. No. 1

Find the equation of tangent and normal to the curve $y=x^2+4x+1$ at the point whose abscissa is 3.

Q. No.2

Prove that the curve $x=y^2$ and $xy=k$ cut at right angles if $8k^2=1$

Increasing and decreasing functions

Q. No.1

Find the intervals in which the function $f(x)=2x^3-15x^2+36x+1$ is strictly increasing or decreasing. Also find the points on which the tangents are parallel to x-axis.

Q. No. 2

Find the intervals in which the function $f(x)=x^3-12x^2+36x+17$ is (a) strictly increasing (b) strictly decreasing.

Increasing and decreasing functions

Q. No. 1

Prove that function $f(x)= x^3-6x^2+12x-18$ is increasing on R.

Q.No.2

Show that function $f(x)= \cos x$ is

(i) strictly increasing on $(-\pi,0)$

(ii) strictly decreasing on $(0, \pi)$

(iii) neither increasing nor decreasing $(-\pi , \pi)$

Thanks

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