Name = Adil Ayaz

I.D = 7889

Section = A

Subject = Applied calculus [redacted]

Submitted to = mam Shomaila

Assignment No = 1

Date [redacted]

Scanned with CamScanner

Scanned with CamScanner

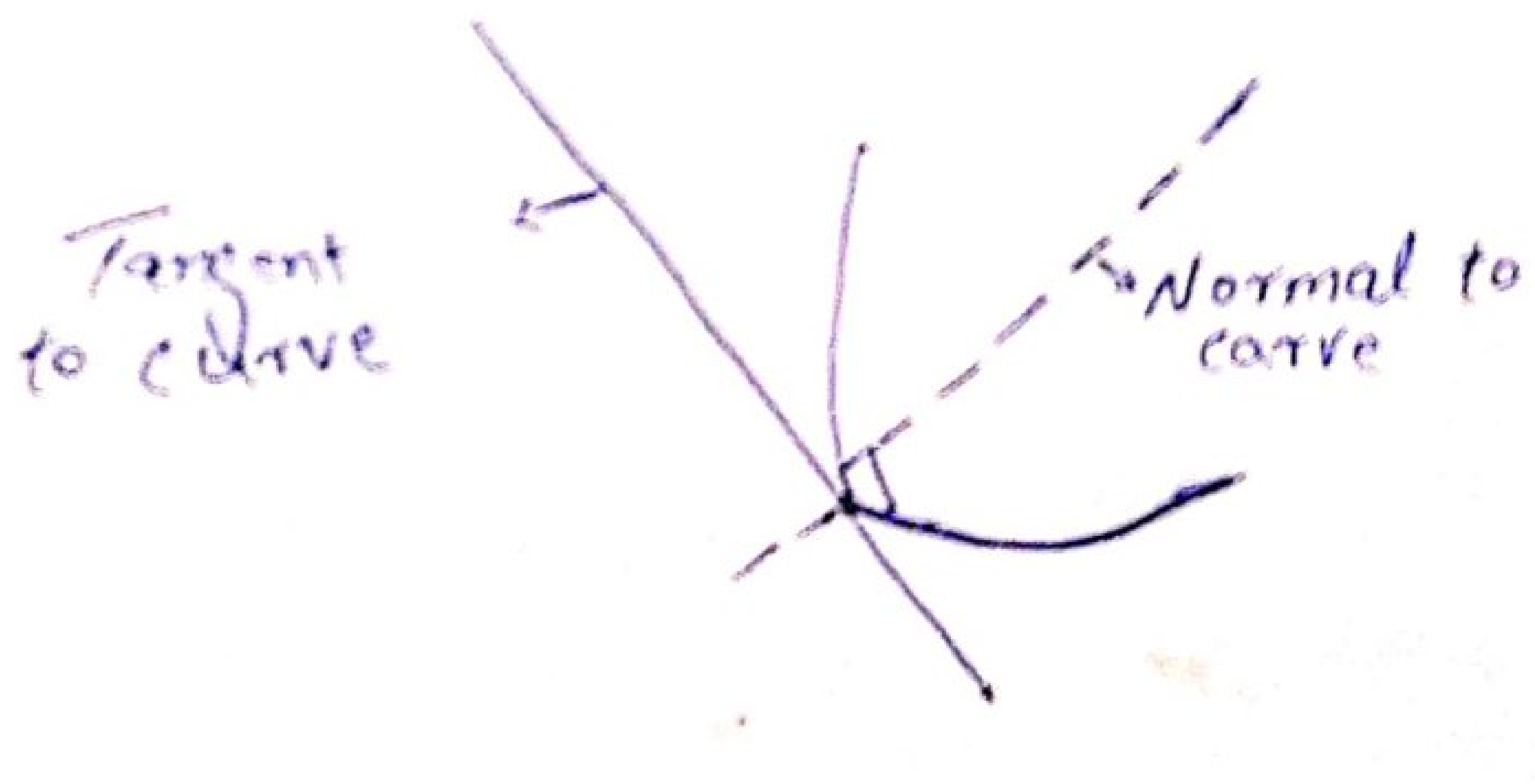
Scanned with CamScanner

we use the derivatives to determine the maximum and minimum values of Particular functions (e.g., cost, Strength, amount to material used in building, Profit, loss etc.

=> Derivatives are met in many engineering and Science probulems, especially when modeling the behavior of moving objects. our disaussion begins with some general application which we can than apply to specific problems

Application of Derivatives.

① Tangents And Normal :- A tangent to a curve is a line that touches the curve at on point and has the Same sulope as the curve at that point. A normal to a curve is a line perpendiaular to a tangent of the curve



Scanned with CamScanner

notes- we can find the (Q) scope of a tangent at any point (x, y) using $\frac{dy}{dx}$

Tangent:- If we are traveling in a car around a corner and we drive over same thing slippery on the road like oil water and our car starts to skid it will continue in a direction tangent to the curve.

Normal:- the spokes of a wheel are placed normal to the circular shape of the wheel at each point where the spoke connects with the center.

Q) Newton method:- the process involves making a guess at the true solution and that applying a formula to get a better guess and so on until we arive at an acceptable approx-imation for the solution

If we wich to find x so that $f(x) = 0$
then we guess some initial value x_0
which is also to desired solution
and ~~than~~ than we get a btter approximation using Newton Method

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

③ Related Rates:- If two variables ③ have a both vary with respect to time and relation between them we can express the rate of chang of one in terms of one another

that is we will be finding $\frac{df}{dt}$ for some function $f(t)$

(4) Curvilinear Motion:- $v = \frac{ds}{dt}$, $a = \frac{dv}{dt} = \frac{d^2s}{dt^2}$

these formulae at only appropriate for rectilinear motion (velocity and acceleration in a straight line). this is inadequate for the most real situations, so we introduce here the concept at curvilinar motion, where an object is moving in a plane along a specified curved path. we generally express the x and y componetn of the motion as function of time this form is called parametric form

Scanned with CamScanner

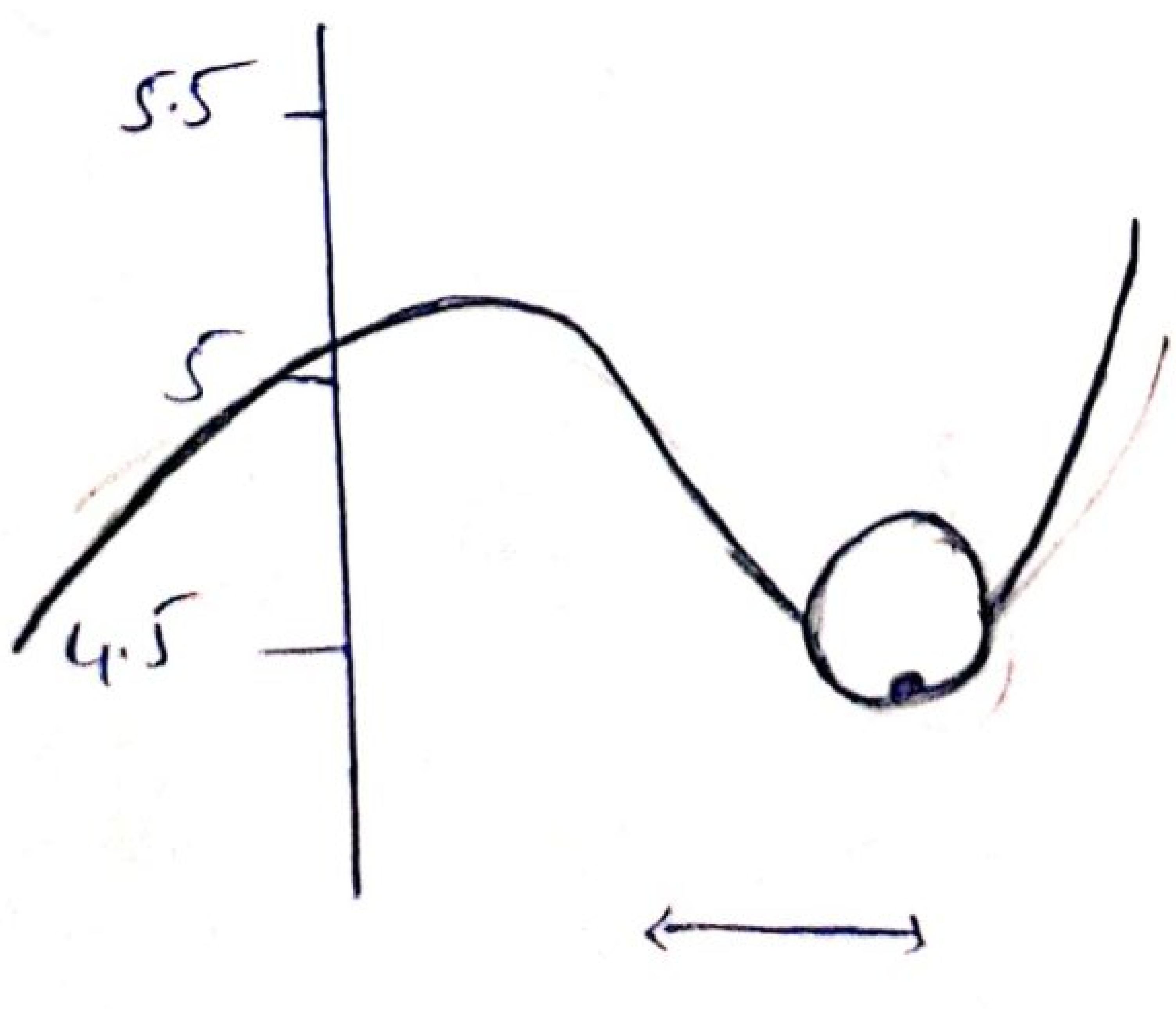
Scanned with CamScanner

(5) Radius of curvature ::

$$\text{Radius of curvature} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}$$

the redius of curvature of the curve at a particular point is defined as the redius of the approximating circule this radius changs as we move along the curve the formula for the redius of curvature at any point

x for the curve $y = f(x)$



5

pplication of Integration::

Integration:- The Proce of finding a function, given its derivtiven is called intgration or anti differentation

) If $F'(x)$ we say $F(x)$ is an nti-derivative et $f(x)$

) It is usually used to find the area.

) Shear Force and Bending Moment::

) Shear force and Bending moment are one of the mportant parameter for structural design these Paratmeter after a structure a clot

2) Take example of a rod suspended between two horizontal Supports and some oad is applied at the centre with pplied of load the beam will bend

=) some force will develop inside the rod which will try to break the rod..

Scanned with CamScanner

Scanned with CamScanner

in direction of force that force is called Shear force and produce of that force with distance from either end is bending moment.

(8) Length of curve:- Corrugated Iron Sheeting:-

=> Corrugated iron is used extensively through out the world as a versatile building material Bending the material into a regular sine wave pattern gives it greater strength than if a flat Sheet is used

=> so integration is used to find out how wide should ~~the flat~~ ~~Sheet~~ be to given as a corrugated Sheet to required width.

③ Area under a curve by Integration:-

In Civil engineering when we are dealing with curve or structure having curves than may need to find the area under the curve which

Scanned with CamScanner

constructed So we (7) integration for this purpose

$$\boxed{Area \int_a^b f(x)\,dx}$$

(4) **Moment of Inertia by Integration**:

moment of Inertia is a geometrical Property of a Section of a Structural member which is required to measure its resistance bending and buckling

=> moment of Inertia about x-axis

$$I_x = \int_A y^2\, dA$$

where y is the y cordinate of the different element of Area dA

=> moment of Inertia about y-axis

$$I_y = \int_A x^2\, dA$$

where x is the x- cordinate of element dA.

Scanned with CamScanner

Scanned with CamScanner

5) centroid of an Area By (8)

zs) In tilt-sulab constrution we have a concrete wall (with doors and windows cut out) which we need to raise into position we don't want the wall to crack as we raise it, so we need to know the centre of mass of the wall we can find the centroid of an area with straigth side, the we will extend the concept to area with area side, where we will ouse integration

Scanned with CamScanner

Scanned with CamScanner