Abhisher Kumer EAS 596 Take Home Pard. Proof. David Salac.

9) (5 1) x 1 (0)

1.b

From the question we have

$$y' = \begin{cases} y(-2) + \frac{1}{4} \\ 1 \end{cases}, \quad y \neq 0$$

For \$ 70, we have

$$\frac{y}{y} = \left(-2t + \frac{1}{t}\right)$$

$$2) \int y' = \int \left(24 + \frac{1}{4}\right) dt$$

2)
$$lm y = -1^2 + lm + C$$

Again, on differentiating both oides, we get $\frac{dy}{dt} = t(-24)e^{-t^2+c} + e^{-t^2+c}$ j = (1-242)6-42+C Putting initial condition $\dot{y}(0) = 1$ and solving ÿ(0)=1 => (1-0)(e-0+c)=1 2) e =1 2) C=0 (1 115) US 16 . . De have $\dot{y} = (1-2t^2)e^{-t^2}$ and $y = \pm e^{-t^2} \quad \text{(last page)}$ and 5 to tal gar 511 " " " " J. J. C. 21.1

1.(c) Using
$$y = \pm e^{-t^2}$$
 from part (b), we get $y = \pm e^{-t^2}$ $y(1) = 1 \cdot e^{-t} = 0.03$
= 0.3678

rightly from me and

The position of point p is given by

 $x = L_1 cos o_1 + L_2 cos o_2$ $h = L_1 sin o_1 + L_2 sin o_2$

As $0, L_1, L_2$ and h are given, the only unknown we have is 0_2 and a. To convert it into a root problem let's form a system of equations and get $f(r, o_2):0$

The system of non-linear equations we get are:

h = Li sino, + Lo sinoo

$$sin\theta_2 = h - L_1 sin\theta_1$$

$$L_2$$

$$\frac{1}{2} = \sin^{-1}\left(\frac{h - L_1 \sin \theta_1}{L_2}\right)$$

and the other equation is: 2= 1,0000, + 1,00002 Now our not problem is:

$$L_{1} \cos \theta_{1} + L_{2} \cos \theta_{2} - 2 = 0$$

 $\sin^{-1} \left(\frac{h - L_{1} \sin \theta_{1}}{L_{2}} \right) - \theta_{2} = 0$

After solving these equations, we'll get oz & a,

$$x = L_1 \cos O_1 + L_2 \cos \left(\sin^{-1} \left(\frac{h - L_1 \sin O_1}{L_2} \right) \right)$$

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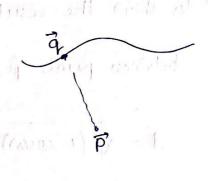
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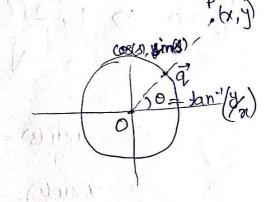
$$\left(\frac{1211}{5}\frac{\mu(1-\lambda)}{5}\right)^{\prime}(\gamma) = 0$$

some of the contract

03. The Junction which is at a q minimum when q is the closest to point \$\bar{p}\$ to \$|\bar{q} - \bar{p}|\\ \end{p}



(b) We know that point à lies on the circumference of the circle with radius 1 so its magnitude will be 1



Also, its very easy to infer from the diagram that point \vec{p} , \vec{q} and center $\vec{0}$ of the circle will be Lotline co-linear, hence the angle that point q makes with x-axis can be given as $0 = \tan^{-1}(y)$, (a,y) is posint \overrightarrow{P} . took of well offer and Almander trades or work

Therefore point q can be given as: $(1\times \cos 0, 1\times \sin 0) \equiv (\frac{\chi}{\sqrt{\chi^2 + H^2}}, \frac{\chi}{\sqrt{\chi^2 + H^2}})$

O To show the result of (b), we can write the distance between points 789 as: $d = \sqrt{(x - \cos(\omega))^2 + (y - \sin(\omega))^2}$

To minimize d, we set:

 $\frac{d(d)}{ds} = 0 \implies \frac{1}{2} \times 2 \frac{((\alpha - \cos(s)) \cdot \sin(s)) + 2(y - \sin(s))(-\cos(s))}{\sqrt{(\alpha - \cos(s))^2 + (y - \sin(s))^2}} = 0$

Leinbor diesentario all \Rightarrow $x \sin(8) - \sin(8)\cos(8) - y\cos(6) + \sin(8)\cos(6) = 0$ \Rightarrow $x \sin(8) = y\cos(8)$

Janes Janes & Janes Bolding

od dlin oliviosides - fan- (4) / m p - 1 / m

with the horar , hence the orgle that pent Here we see that point of on the interface is at minimum distance from point p when 8: lan' (%) which is consistent with the angle O we had

assumed in part (b).

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