Tangent Plane and Normal Line Tangent plane & Normal line:-

Monday, June 22, 2020 10:56 AM

23.085

Chain Rule:-

0.01 21.37

$$\frac{dT}{dt} = \frac{\partial T}{\partial c}\cdot\frac{dc}{dt} + \frac{\partial T}{\partial s}\frac{ds}{dt}$$ — 0.2

$$T(c,s) = 57\, s^2\sqrt{0.95+c}$$

$$\frac{\partial T}{\partial c} = \frac{57\, s^2}{2\sqrt{0.95+c}} \quad , \quad \frac{\partial T}{\partial s} = \sqrt{0.95+c}\cdot(104)s$$

$s = 1,\ c = 0.5\ ,\ T(c,s) \approx 57$

2)

2.74

57 ± 2.74

$$T(x,y) = \frac{120x^2}{x^2+y^2}$$

5)

$$\nabla f(2,2) = \langle f_x , f_y \rangle$$

$$\# \quad \nabla f(x,y) = \left\langle \frac{240xy^2}{(x^2+y^2)^2} , \frac{-240x^2y}{(x^2+y^2)^2} \right\rangle$$

At $(2,2) \Rightarrow$

$$\nabla f(2,2) = \langle 30, -30 \rangle$$

Max rate of change = $30\sqrt{2}$

Direction is mentioned in terms of unit vector always.

$$\hat{u} = \frac{\langle 30, -30 \rangle}{\sqrt{900+900}} = \frac{\langle 30, -30 \rangle}{30\sqrt{2}}$$

$$= \left\langle \tfrac{1}{\sqrt{2}}, -\tfrac{1}{\sqrt{2}} \right\rangle$$

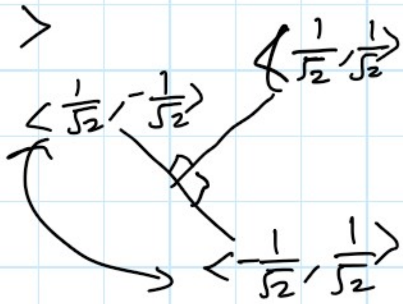
$$= \left\langle \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right\rangle$$

6)

$$\nabla f_{(1,-1)} = \left\langle \frac{240}{4}, -\frac{240(-1)}{4} \right\rangle$$

$$= \langle 60, 60 \rangle$$

$$\hat{v} = \frac{\langle 60, 60 \rangle}{\sqrt{2 \times 60^2}} = \left\langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle$$



Required direction :-

a) $\left\langle -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle$

b) $\left\langle \frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right\rangle$