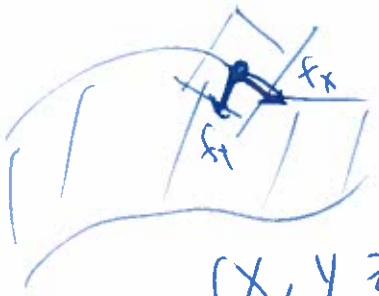
TANGENT PLANES



$f(x,y) = z$

(x, y, z)

$\langle i, k \rangle$

$\langle 1, 0, f_x \rangle$

$\langle 0, 1, f_y \rangle$

$\langle f_x, f_y, -1 \rangle = \vec{n} = \langle -f_x, -f_y, 1 \rangle$ ok

$(x_0, y_0, f(x_0, y_0))$

$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$

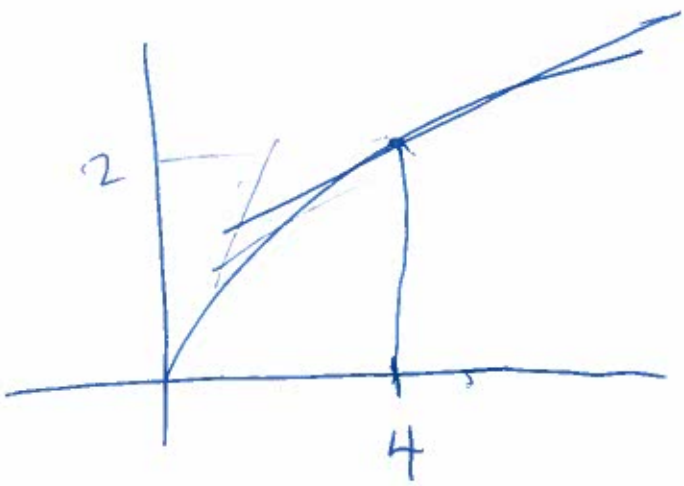
$0 = -f_x(x - x_0) - f_y(y - y_0) + 1(z - f(x_0, y_0))$

$f_x(x - x_0) + f_y(y - y_0) = z - f(x_0, y_0)$

$f_x(x - x_0) + f_y(y - y_0) + f(x_0, y_0) = z$

$Ax + By + Cz = D$

CALC 1



$\sqrt{x}$ $\quad -\frac{1}{2}x^{-1/2}$

$f'(4) = \frac{-1}{2 \cdot 2}$

$\sqrt{5}$ $\quad = +\frac{1}{4}$

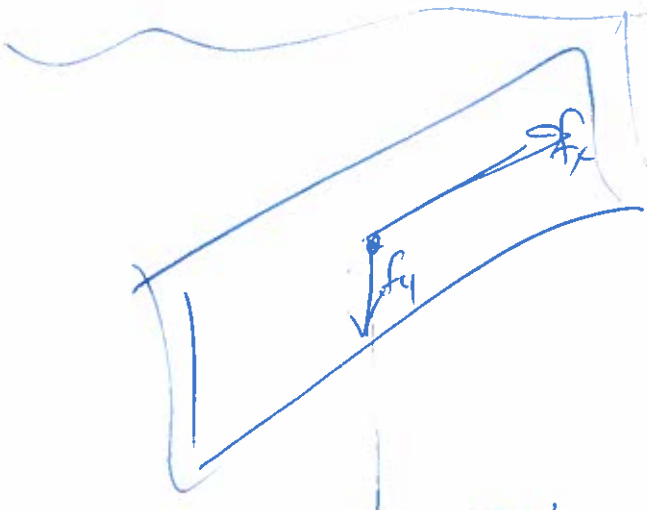
(4, 2)

EQ OF LINE

$f(x) = 2 + f'(4)(x-4)$

$f(x) = 2 + +\frac{1}{4}(x-4)$

$f(5) = 2 + \frac{1}{4} = 2.25$



$z(x,y) =$

$f(x_0,y_0) + f_x(x-x_0)$

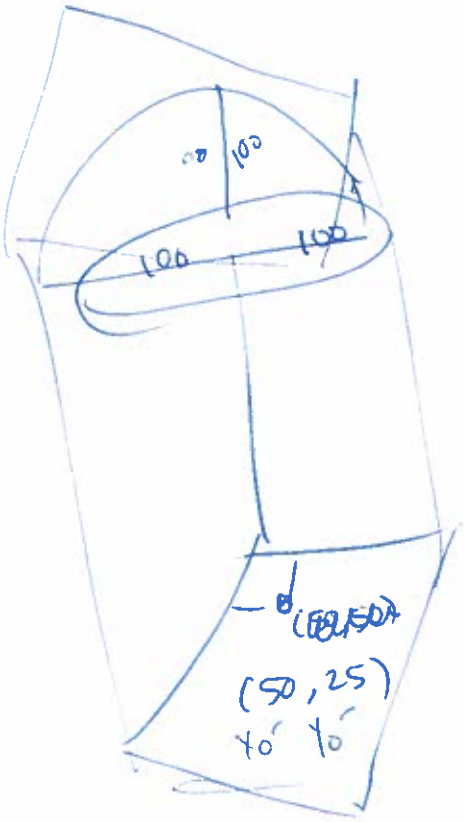
$+ f_y(y-y_0)$

$L(x,y,z) = f(x_0,y_0,z_0) +$

$f_x(x-y_0)$

$f_y(y-y_0)$

$f_z(z-z_0)$



$$\frac{x^2}{100^2} + \frac{y^2}{100^2} + \frac{(z-1000)^2}{100^2} = 1$$

$$(z-1000)^2 = 100^2 - x^2 - y^2$$

$$z = 1000 \pm \sqrt{100^2 - x^2 - y^2}$$

$$z_x = \frac{1}{2}(100^2 - x^2 - y^2)^{-1/2} \cdot (-2x)$$

$$z_y = \frac{1}{2}(100^2 - x^2 - y^2)^{-1/2} \cdot (-2y)$$

$$z_x(50,25) = -.603\ldots$$

$$z_y(50,25) = -.301\ldots$$

$$\vec{n} = \langle +.603, +.301\ldots, +1 \rangle$$

point $(50, 25, 1082.9156\ldots)$

$$(.603\ldots)(x-50) + (.301\ldots)(y-25) + 1082.91 = z$$

GROUP NAME: Bio	**Student Names (First and Last)**
Logo:	**Speaker/Presenter:** James
Date: 10-1-13	**Writer/Prep:** Piyush
Topics: Tangent Surfaces	**QC/Leader:** Shawnee

Instructions: Eq of the Plane $z = 1.53x + .96y + 9.517$

Cen Le.- $(2.5, 2.5, 10)$

$$\frac{(x-2.5)^2}{2.5^2} + \frac{(y-2.5)^2}{2.5^2} + \frac{(z-10)^2}{9} = 1$$

$$(z-10)^2 = 9 - \frac{9(x-2.5)^2}{2.5^2} - \frac{9(y-2.5)^2}{2.5^2}$$

$$z = 10 \pm \sqrt{9 - \frac{9(x-2.5)^2}{2.5^2} - \frac{9(y-2.5)^2}{2.5^2}}$$

$$z = 10 + \left(9 - \frac{9(x-2.5)^2}{2.5^2} - \frac{9(y-2.5)^2}{2.5^2}\right)^{1/2}$$

$$z_x = \frac{1}{2}\left(9 - \frac{9(x-2.5)^2}{2.5^2} - \frac{9(y-2.5)^2}{2.5^2}\right)^{-1/2} \cdot \left(\frac{18(x-2.5)}{2.5^2}\right)$$

$$z_y = \frac{1}{2}\left(9 - \frac{9(x-2.5)^2}{2.5^2} - \frac{9(y-2.5)^2}{2.5^2}\right)^{-1/2} \cdot \left(\frac{18(y-2.5)}{2.5^2}\right)$$

$$z_x(1, 1.25) = \frac{1}{2}(9 - 3.24 - 2.25)^{-1/2} \cdot (-4.32)$$
$$= -1.153$$

$$z_y(1, 1.25) = \frac{1}{2}(9 - 3.24 - 2.25)^{-1/2} \cdot (-3.6)$$
$$= -.96$$

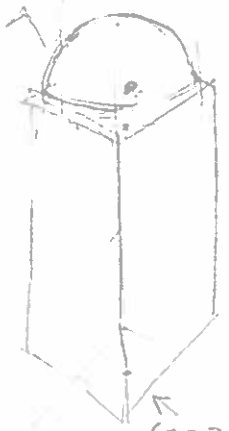
$N = \langle +1.153, +.96, 1 \rangle$

GROUP NAME: 42	**Student Names (First and Last)**
Logo:	**Speaker/Presenter:** Ben Durbrick
Date:	**Writer/Prep:** Kyle Hamilton
Topics:	**QC/Leader:** Gary Greveling

Instructions:

$A = 1$
$B = 1$
$C = 1$
$D = 50^2$

$x_0 = 20$
$y_0 = 20$



$$z = \sqrt{\frac{D - Ax^2 - By^2}{C}} + 100 \quad \text{height of lids}$$

$$z_x = \frac{1}{2}\left(\frac{D - Ax^2 - By^2}{C}\right)^{-1/2} \cdot -\frac{A}{C} 2x$$

$$z_y = \frac{1}{2}\left(\frac{D - Ax^2 - By^2}{C}\right)^{-1/2} \cdot -\frac{B}{C} 2y$$

$$z_x = \left(\frac{50^2 - x^2 - y^2}{1}\right)^{-\frac{1}{2}} \cdot x$$

$$z_y = (50^2 - x^2 - y^2)^{-1/2} \cdot -y$$

$$f_x(x - x_0) + f_y(y - y_0) + f(x_0, y_0) = z$$

$$\underbrace{(50^2 - 20^2 - 20^2)^{-1/2} \cdot (-20)}_{-.485}(x - 20) + (-.485)(y - 20) + \sqrt{50^2 - 20^2 - 20^2} + 100 = z$$

$$-.485x + 9.7 + (-.485y + 9.7) + 144.23 = z$$

$$\boxed{160.63 - .485x - .485y = z}$$

for $-50 \le x \le 50$
$-50 \le y \le 50$

GROUP NAME: Team OP

Logo:

Date: 10/11/13

Topics: Tangent surface to dome

Student Names (First and Last)

Speaker/Presenter: Amanda

Writer/Prep: J.B

QC/Leader: ~~Bianca~~ D.Svitlik

Instructions:

$$\frac{(x-50)^2}{50^2} + \frac{(y-50)^2}{50^2} + \frac{(z-400)^2}{420} = 1$$

$$\sqrt{\frac{420(x-50)^2}{50^2} + \frac{420(y-50)^2}{50^2}} + 400 = -z$$

$$Z_x = \frac{1}{2}\left(\frac{420(x-50)^2}{50^2} + \frac{420(y-50)^2}{50^2}\right)^{-\frac{1}{2}} \cdot \frac{42(x-50)}{125} = 28.39$$

$$Z_y \text{ same} \cdot \frac{42(y-50)}{125} = 113.57$$

$z_x = 28.39$

$z_y = 113.57$

$z = 416.9$

point $(60, 90, 416.9)$

$\vec{n} \langle 28.39, 113.5, 1 \rangle$

$28.39(x-60) + 113.5(y-90) + 416.9 = z$

GROUP NAME: Engineers	**Student Names (First and Last)**
Logo:	**Speaker/Presenter:** Chris
Date:	**Writer/Prep:** Dan
Topics:	**QC/Leader:** Matt, Minsup

Instructions:

$$\frac{(X-37.5)^2}{37.5^2} + \frac{(Y-37.5)^2}{37.5^2} + \frac{(Z-100)^2}{16} = 1$$

$$Z = 100 + \sqrt{16\left(1 - \frac{(X-37.5)^2}{37.5^2} - \frac{(Y-37.5)^2}{37.5^2}\right)}$$

$$= 100 + 4\sqrt{1 - \frac{(X-37.5)^2}{37.5^2} - \frac{(Y-37.5)^2}{37.5^2}} \rightarrow \text{at } (X=60, Y=90) = 103.189$$

$$f_x = \left(\frac{1}{8\sqrt{1 - \frac{(X-37.5)^2}{37.5^2} - \frac{(Y-37.5)^2}{37.5^2}}}\right)\left(\frac{2(X-37.5)}{37.5^2}\right) = \frac{X-37.5}{5625\sqrt{1 - \frac{(X-37.5)^2}{37.5^2} - \frac{(Y-37.5)^2}{37.5^2}}}$$

$$f_y = \frac{Y-37.5}{5625\sqrt{1 - \frac{(X-37.5)^2}{37.5^2} - \frac{(Y-37.5)^2}{37.5^2}}} \rightarrow \approx .00892$$

$\downarrow$

$-.08028$

$-.08028(X-60) - .00892(Y-90) + 103.189 = Z$