GROUP NAME: Doughmakers	Student Names (First and Last)
Logo:	Speaker/Presenter: Brian
Date: ~~3/25~~/2013	Writer/Prep: Alan
Topics:	QC/Leader: Pat
Instructions: #2 #11	

#2a. $\vec{AB} = \langle 1,2,3\rangle = \vec{v}$

$\vec{AC} = \langle 3,-2,1\rangle = \vec{w}$

$$\cos^{-1}\left(\frac{\vec{v}\cdot\vec{w}}{\|\vec{v}\|\|\vec{w}\|}\right) = \theta$$

$$\cos^{-1}\left(\frac{1(3)+2(-2)+3(1)}{\sqrt{1^2+2^2+3^2}\cdot\sqrt{1^2+2^2+3^2}}\right) =$$

$$\cos^{-1}\left(\frac{1}{7}\right) = \boxed{81.79^\circ}$$

#2b.

$\vec{v} \times \vec{w} = \text{normal}$

$$\begin{matrix} x & y & z \\ 1 & 2 & 3 \\ 3 & -2 & 1 \end{matrix}$$

$= \langle 8, 8, -8\rangle$

$8x + 8y - 8z = D$ $D = 0$

$8(0) + 8(0) - 8(0) = D$

$$\boxed{\begin{matrix} 8x + 8y - 8z = 0 \\ \text{or} \\ x + y - z = 0 \end{matrix}}$$

#11 $z = 32 - x^4 + 16xy - y^4$

a) $z_x = -4x^3 + 16y = 0$ $y = \frac{x^3}{4}$ $(0,0)$

$z_y = 16x - 4y^3 = 0$ $x = \frac{y^3}{4}$ $(0,0)$

Critical Point: $(0,0)$

b) $D = z_{xx} z_{yy} - (z_{xy})^2$

$= (-12x^2)(-12y^2) - (16)^2$

$= (-12\cdot 0^2)(-12\cdot 0^2) - 16^2 = -256$

$D < 0$

$\therefore$ Saddle Point

GROUP NAME: MECHANICAL ENGINEERS

Logo:

Date: 03/25/2013

Topics: 3", 10"

Student Names (First and Last)

Speaker/Presenter: Suraj Porangada.

Writer/Prep: Nick Chiavari.

QC/Leader: Renzo Changanaqui

Instructions:

#3, #10

③ If a sailor at location A(1,2,0) in a map leaves heading towards location B(6,2,1) on the map. at the same time a submarine leaves location C(3,-2,1) on the map and follow the equation $r(t) = \langle 3-2t, -2+2t, 2t+1 \rangle$ on the maps. Will the paths cross?

$\vec{B}-\vec{A} = \langle 6-1, 2-2, 1-0 \rangle$

$\vec{B}-\vec{A} = \langle 5, 0, 1 \rangle$

$\vec{A} + s(\vec{B}-\vec{A}) = (1,2,0) + s(5,0,1)$

$r(s) = \langle 5s+1, 2, s \rangle$

$2 = -2+2t$

$t = 2$

$2t+1 = s$

$4+1 = s$

$5 = s$

$3-2t = 5s+1$

$3-2(2) = 5(5)+1$

$3-4 = 25+1$

$-1 \neq 26$

No, the paths don't cross

10.

Find the direction derivative of the function $f(x,y) = yx^2 + 9\cos(xy)$ at the point (1,2) in the direction of the point (2,1)?

At point (1,2)

$df/dx\,(1,2) = 2xy - 9y \sin(xy)$

$df/dy\,(1,2) = x^2 - 9x \sin(xy)$

Gradient is

$f(1,2) = [2xy - 9y \sin(xy)]i + [x^2 - 9x \sin(xy)]j$

$= (2xy - 9y \sin(xy),\ x^2 - 9x \sin(xy))$

Let $u = u_1 i + u_2 j$ be a unit vector

At (1,2)

$D_u f(3,2) = df(1,2).u$

$= [2xy - 9y \sin(xy)\, i + x^2 - 9x \sin(xy) j].(u_1 i + u_2 j)$

$= 2xy - 9y \sin(xy) u_1 + x^2 - 9x \sin(xy) u_2$

$$u = \frac{(2,1)}{|(2,1)|} = \frac{(2,1)}{\sqrt{2^2+1^2}} = \frac{(2,1)}{\sqrt{5}} = (2/\sqrt{5},\ 1/\sqrt{5})$$

$D_u f(1,2) = 2xy - 9y \sin(xy) u_1 + x^2 - 9x \sin(xy) u_2$

$$= \frac{2xy - 9y \sin(xy)}{\sqrt{5}} + \frac{x^2 - 9x \sin(xy)}{\sqrt{5}},$$

$$= \frac{2xy - 18y \sin(xy) + x^2 - 9x \sin(xy)}{\sqrt{5}}$$

$$= \frac{4 - 36 \sin 2 + 1 - 9 \sin(2)}{\sqrt{5}}$$

$$= \frac{4 - 32.734 + 1 - 9\sin(2)}{\sqrt{5}}$$

$$= \frac{-35.91}{\sqrt{5}}$$

$= -16.05$

GROUP NAME: Compsci

Logo:

Date: 3/25/13

Topics:

Student Names (First and Last)

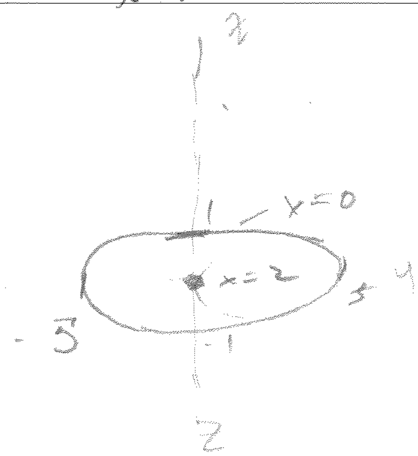
Speaker/Presenter: [illegible]

Writer/Prep:

QC/Leader: Eric Zhuang

Instructions: 4) centred at origin in cm. Y-Z plane slices of egg $X = 0, 2, 4$ cm discuss illegularities

$$\frac{x^2}{4} + \frac{y^2}{25} + z^2 = 1$$



$X = 0$ $$\frac{y^2}{25} + z^2 = 1$$

$X = 2$ $$\frac{y^2}{25} + z^2 = 0$$

$X = 4$ $$\frac{y^2}{25} + z^2 = -3$$

9) chain rule + Implicit Differentiation for partial of y with respect to x

$F(x,y,z)=0$ $\quad$ $z^2 = x^3 - 2x^2y + 10y^3 - z^2 = f$

$\frac{\partial y}{\partial x} = \frac{\frac{\partial F}{\partial x}}{\frac{\partial F}{\partial y}}$

$\frac{\partial F}{\partial x} = \frac{\partial}{\partial x} = 0 = 3x^2 - 4xy =$

$\frac{\partial F}{\partial y} = \frac{\partial}{\partial y} = 0 = -2x^2 + 30y^2$

$\frac{\partial y}{\partial x} = \frac{-\partial F/\partial x}{\partial F/\partial y} = \frac{-3x^2 - 4xy}{-2x^2 + 30y^2}$

$=$

$2z = 0$

b. eq. of tangent plane to the surface $z^2 = x^3 - 2x^2y + 10y^3$ at $(1,1,3)$

Tangent plain:

$f(x,y,z) = 0 \ @ \ (x_0, y_0, z_0)$

$f_x(x - x_0) + f_y(y - y_0) + f_z(z - z_0) = 0$

$(3x^2 - 4xy)(x-1) + (-2x^2 + 30y^2)(y-1) + 2z(z-3)$

$(3(1)^2 - 4(1))(x-1) + (-2 + 30)(y-1) + 2(3)(z-1) = 0$

$-x + 1 + -28y + 28 + 6z - 6 = 0$

$-x - 28y + 6z + 23 = 0$

GROUP NAME: Kyle Gerheiser	Student Names (First and Last)
Logo:	Speaker/Presenter: ____
Date:____	Writer/Prep:____
Topics:	QC/Leader:____

Instructions:

5.

$r(t) = 450\cos(t)\,i + 450\sin(t)\,j + \frac{500t}{\pi}\,k$

$r(0) \rightarrow r(10\pi)$

$\int_0^{10\pi}$

speed at 10π

Direction $t = 10\pi$

$r'(t) = -450\sin(t)\,i + 450\cos(t)\,j + \frac{500}{\pi}\,k$

$|r'(t)| = \sqrt{(-450\sin(t))^2 + (450\cos(t))^2 + \left(\frac{500}{\pi}\right)^2} = \sqrt{450^2 + \frac{250000}{\pi^2}}$

$\int_0^{10\pi} 450 + \frac{250{,}000}{\pi^2} = 450t + \frac{250{,}000t}{\pi}\Big|_0^{10\pi} = \boxed{4500\pi + \frac{2.5\times10^6}{\pi}}$

Speed $r'(t) = -450\sin(t)\,i + 450\cos(t)\,j + \frac{500}{\pi}\,k$

$450 + \frac{250{,}000}{\pi^2}$

$r(10\pi) = \frac{450i}{5020} + 0j + \frac{5000k}{5020}$ Direction at 10π

$R = \{(x,y): 0 < x < 2, 1 < y < 5)$

$\iint (x^2 + 4xy)\,dA = \int \frac{x^3}{3} + 2y\frac{x^2}{2}\,dx \quad \int \frac{x^3}{3} + 2yx^2\,dy$

$\boxed{\frac{x^3}{3}y + x^2y^2}$

$\int_{-1}^{2}\int_{3}^{4} (3x + 5y)\,dy\,dx$

$\int_{3}^{4} 3x + 5y\,dy = 3xy + \frac{5y^2}{2}\Big|_{3}^{4} = (12x + 40) - (9x + \frac{45}{2})$

$3x - 17.5$

$\int_{-1}^{2} 3x - 17.5\,dx = \frac{3x^2}{2} - 17.5x\Big|_{-1}^{2} = (6 - 35) - (\frac{3}{2} + 17.5) =$

$\boxed{-29 - 19 = -48}$

GROUP NAME: ¡Derive Logo:	Student Names (First and Last) Speaker/Presenter: Kate MORAN + JoannaP Writer/Prep: Michael McNulty QC/Leader: Joe Hyppolite
Date: 3/25/13 Topics:	
Instructions: 6 & 7 of Midterm Practice	

6. $F(x,y) = \dfrac{2x-9y^2}{9x^2-2y}$ Find $\lim_{(x,y)\to(0,0)} F(x,y)$ along paths: $x=0$, $y=x$

along $x=0$:

$$\lim_{(0,y)\to(0,0)} \frac{2(0)-9y^2}{9(0)^2-2y} = \lim_{y\to 0} \frac{9y}{2} = 0$$

along $y=x$:

$$\lim_{(x,x)\to(0,0)} \frac{2x-9x^2}{9x^2-2x} = \lim_{x\to 0} \frac{\cancel{x}(2-9x)}{\cancel{x}(9x-2)} = \frac{2}{-2} = -1$$

Because the limits do not match;

a) $\lim_{(x,y)\to(0,0)} f(x,y) = DNE$

b) Continuous?

No, the limit does not exist

c) Can you add a piece to make it continuous?

No, it is a tear.

7. $g(x,y) = \cos y \, e^{7x}$ & $x(u,v) = 2u+5v$, $y(u,v) = 3u-2v$

$$\frac{\partial g}{\partial y} = -e^{7x}\sin y = -e^{7(2u+5v)}\sin(3u-2v)$$

$$\frac{\partial g}{\partial x} = 7e^{7x}\cos y = 7e^{7(2u+5v)}\cos(3u-2v)$$

$$\frac{\partial x}{\partial u} = 2$$

$$\frac{\partial y}{\partial u} = 3$$

$$\frac{\partial g}{\partial u} = \frac{\partial g}{\partial x}\frac{\partial x}{\partial u} + \frac{\partial g}{\partial y}\frac{\partial y}{\partial u} = e^{14u+35v}\left(14\cos(3u-2v) - 3\sin(3u-2v)\right)$$

GROUP NAME: Engees	Student Names (First and Last)
Logo:	Speaker/Presenter: Brendan
Date: 3/25/13	Writer/Prep:
Topics:	QC/Leader: Felipe

Instructions: #8 Practice test

#5 on back

$E = MC^2$

$dE = E_m\,dm + E_c\,dc$

$E_M = c^2$

$E_c = 2MC$

$dE = c^2\,dm + 2MC\,dc$

$M = 8.1 \qquad dm = \pm 0.05$

$c = 24 \qquad dc = \pm 0.5$

$dE = (24)^2(\pm 0.05) + 2(8.1)(\pm 0.5)$

$= \pm 417.6$

#5

$\vec{r(t)} = 450\cos t + 450\sin t + \frac{500t}{\pi}$

Speed at $t = 10\pi$

$\vec{r'(t)} = -450\sin t\vec{i} + 450\cos t\vec{j} + \frac{500}{\pi}\vec{k}$

$\vec{r'(10\pi)} = -450\sin(10\pi)\vec{i} + 450\cos(10\pi)\vec{j} + \frac{500}{\pi}\vec{k}$

$\sqrt{(-450\sin(10\pi))^2 + (450\cos(10\pi))^2 + \left(\frac{500}{\pi}\right)^2}$

$= \sqrt{450^2 + \frac{250{,}000}{\pi^2}}$

Direction at $t = 10\pi$

$\vec{r(10\pi)} = \langle -450\sin(10\pi),\ 450\cos(10\pi),\ \frac{500}{\pi} \rangle$

$\boxed{\vec{r(10\pi)} = \langle 0, 450, \frac{500}{\pi} \rangle}$

Arc length

$\int_0^{10\pi} 450^2 + \frac{250{,}000}{\pi^2}\, dt = 450^2 + \frac{250{,}000}{\pi^2} \Big|_0^{10\pi} = \boxed{10\pi\left(450^2 + \frac{250{,}000}{\pi^2}\right)}$

GROUP NAME: SCEBEs	Student Names (First and Last)
Logo:	Speaker/Presenter: William E. Carter, Jr
Date: 3/25/2013	Writer/Prep: Zahin
Topics: MAT251 - Multivariable Calculus III MidTerm Practice	QC/Leader: William E. Carter

Instructions: #12 The product of three numbers x, y, z is 125. Use substitution to minimize the sum $(x+y+z)$ of the numbers. (hint: $xyz = 125$ so $z = ?$) Use Lagrange multipliers to solve above problem.

$\boxed{g(x,y,z) = xyz = 125}$ & $\boxed{f(x,y,z) = x+y+z}$

$$x = \frac{125}{yz} \Rightarrow g\left(\frac{125}{yz}, y, z\right) = \left(\frac{125}{yz}\right)(y)(z) = 125$$

$$y = \frac{125}{xz} \Rightarrow g\left(x, \frac{125}{xz}, z\right) = (x)\left(\frac{125}{xz}\right)(z) = 125$$

$$z = \frac{125}{xz} \Rightarrow g\left(x, y, \frac{125}{xy}\right) = (x)(y)\left(\frac{125}{xy}\right) = 125$$

So $\frac{125}{yz} = \frac{125}{xz} = \frac{125}{xy} \Longleftrightarrow yz = xz = xy$.

So $x = y = z$ thus, $x^3 = 125 \Longleftrightarrow x = \sqrt[3]{125} = 5$

&

$y^3 = 125 \Longleftrightarrow y = \sqrt[3]{125} = 5$

$z^3 = 125 \Longleftrightarrow z = \sqrt[3]{125} = 5$

$g(5,5,5) = (5)(5)(5) = 125$

$f(5,5,5) = 5+5+5 = 15$

turn page

$g(x,y,z) = xyz = 125 \quad , \quad f(x,y,z) = x+y+z$

$\nabla f(x,y,z) = \langle f_x, f_y, f_z \rangle = \lambda \nabla g(x,y,z)$

$$\begin{aligned} f_x &= 1 = \lambda g_x = \lambda yz \\ f_y &= 1 = \lambda g_y = \lambda xz \\ f_z &= 1 = \lambda g_z = \lambda xy \end{aligned} \qquad \left.\begin{aligned} \lambda yz &= 1 \\ \lambda xz &= 1 \\ \lambda xy &= 1 \end{aligned}\right\} \quad \begin{aligned} \lambda yz = \lambda xz = \lambda xy \\ yz = xz = xy \end{aligned}$$

So $y = x = z$ & $x^3 = y^3 = z^3 = 125$. Thus, $\left\{\begin{aligned} x &= \sqrt[3]{125} = 5 \\ y &= \sqrt[3]{125} = 5 \\ z &= \sqrt[3]{125} = 5 \end{aligned}\right\}$ &

$f(5,5,5) = 5+5+5 = 15$

$g(5,5,5) = (5)(5)(5) = 125$