MA 121 - 002

Tuesday, April 16

6.1: (functions of more than one variable)
review for TEST #4

TEST #4: THURS, APRIL 18th
(4.5, 5.1, 5.2, 5.3, 5.6, 5.7)

class eval.

6.1:

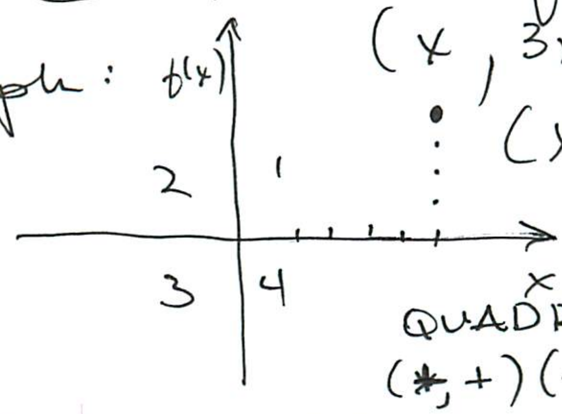
functions of ONE variable

$f(x) = 3x^2 - 5x + 1$ $\quad (x, f(x))$

$(x, 3x^2-5x+1)$

2D graph:

(x, y)



QUADRANTS
$(+,+)(-,+)\ldots$

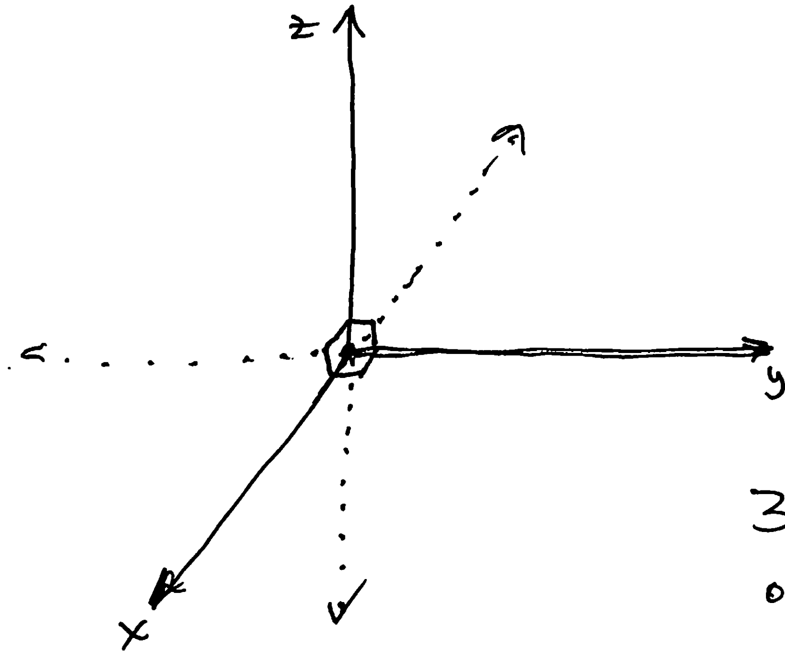
functions of more than one variable:

$f(x,y) = 3x^2 + 4xy - 8y^2$ $\quad (x, y, f(x,y))$
ordered triple

3D graph

$(x, y, 3x^2+4xy-8y^2)$

(x, y, z)



3 AXES are $\perp$

origin $(0,0,0)$

8 REGIONS:

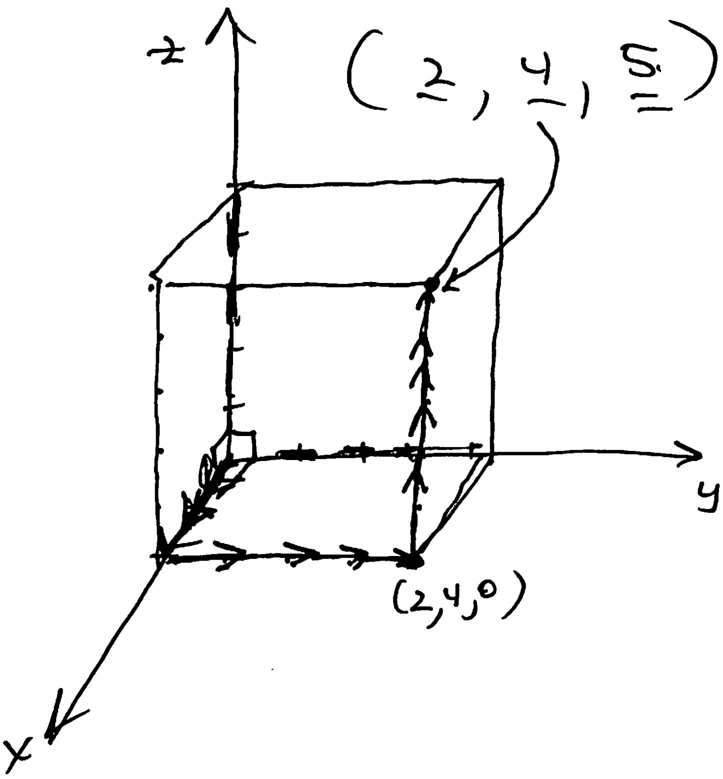
OCTANTS

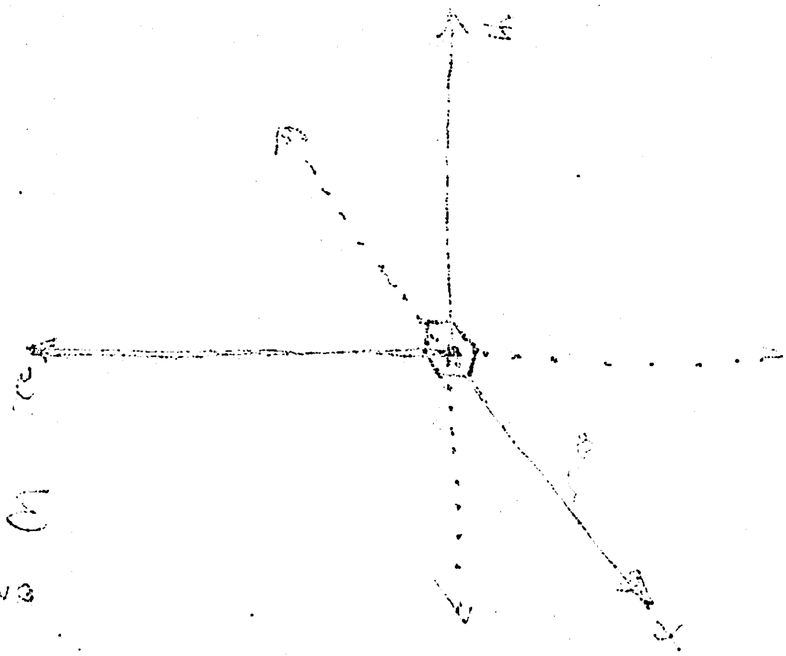
$(+,+,+)$

$(+,+,-)$

$(+,-,+)$

$\vdots$





3 axes are $\perp$

origin $(0,0,0)$

8 regions:

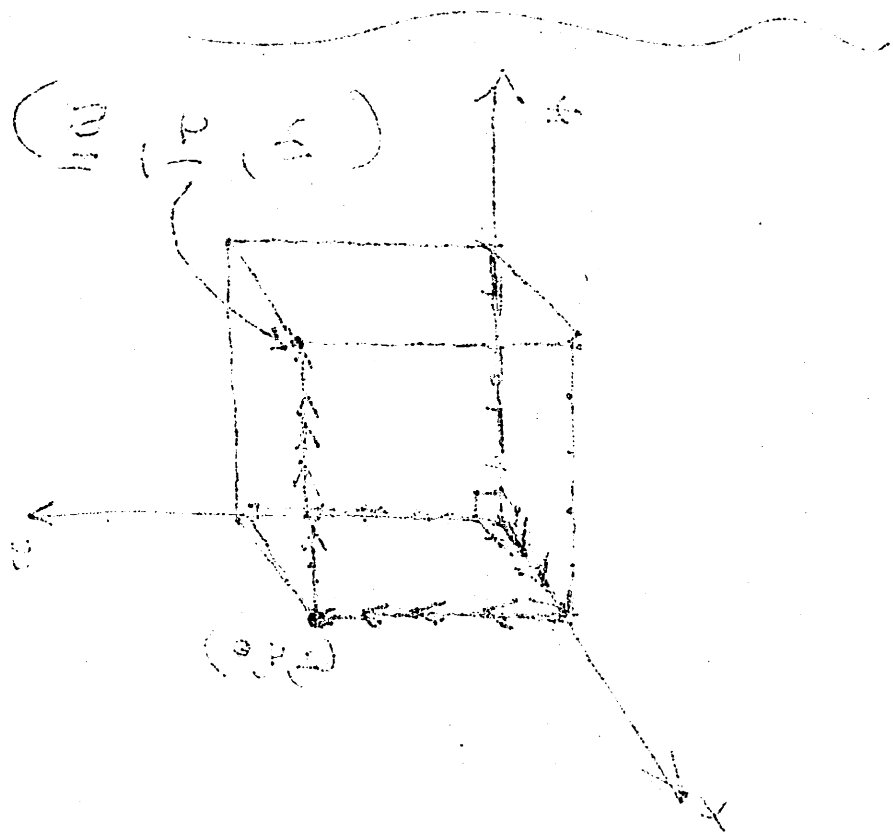
OCTANTS

$(+,+,+)$

$(-,+,+)$

$(+,-,+)$

$\vdots$



$$f(T, V) = 35.74 + 0.6215T - 35.75V^{.16} + .4275 \cdot T \cdot V^{.16}$$

T = temp.

v = wind speed

(wind chill)

T = 32°

v = 10 mph

$$f(32°, 10\text{mph}) = 35.74 + .6215(32) - 35.75(10)^{.16} + (.4275)(32)(10)^{.16}$$

$$\approx 23.72°$$

HEAT INDEX:

$$g(T, H) = 1.98T - 1.04(1-H)(T-58) - 56.9$$

%

T = 98°

H = .75

$$g(98°, .75) = 1.98(98) - 1.04(1-.75)(98-58) - 56.9$$

$$= \underline{126°}$$

$$WC(V,T) = 35.74 + 0.6215\,T - 35.75\,V^{.16} + .4275\,T\cdot V^{.16}$$

T = temp.
V = wind speed
(wind chill)

$T = 32^\circ$
$V = 10$ mph

$$WC(32^\circ, 10\,mph) = 35.74 + .6215(32) - 35.75(10)^{.16} + (.4275)(32)(10)^{.16}$$
$$\approx 23.72^\circ$$

HEAT INDEX:

$$HI(T,H) = 1.98\,T - 1.09(1-H)(T-58) - 56.9$$

$T = 98^\circ$
$H = .75$

$$HI(98^\circ, .75) = 1.98(98) - 1.09(1-.75)(98-58) - 56.9$$
$$= \underline{126^\circ}$$

TEST #4:

4.5: Integration using SUBSTITUTION:

let $u =$ ~~~ integrate ... subst back

$du =$ ~~~

5.1: Eq. Point: $(D(x) = S(x))$

find C.S. : $\int_0^{x_E} D(x) - [\$ \text{ BOX}]$

find P.S. : $[\$ \text{ BOX}] - \int_0^{x_E} S(x)$

5.2: accumulation models

accum F.V. : $\int_{t_0}^{t_1} P_0 \cdot e^{kt}\, dt$ $\quad \left\{ \begin{array}{l} P = P_0 \cdot e^{kt} \\ \text{(one-time)} \end{array} \right.$

($ or natural res. usage.)

5.3: Improper integrals:

$\int_a^\infty f(x)\,dx \cdots > \lim_{B\to\infty} \int_a^B f(x)\,dx$ integrate, evaluate, simplify

then take limit as $B \to \infty$

(converge or diverge)

5.6: Volumes of Solids of Revolution

$\int \pi r^2 h \longrightarrow \int_{x_0}^{x_1} \pi (f(x))^2 \cdot dx$

$r = f(x)$

$h = \Delta x \to dx$

5.7: Separable D.E.'s

1. sep. x and dx's from y and dy's.
2. integrate ($+c$)
3. solve for y

JRG

Name SOLUTIONS Row___Seat___

NORTH CAROLINA STATE UNIVERSITY Department of Mathematics

MA121-002 Quiz #3 Due Thursday, April 11 (at the beginning of class) J. Griggs

Three points per question (1 point for following directions); you are to work **individually** on this quiz; it is permissible to use your book and/or notes from the class. Show **all** work and any graphs/diagrams on <u>**this**</u> sheet. (use the back, if necessary; *no additional pages*, please)

1.). At age 31, Kelli earns her MBA and accepts a position as the creative team leader at Netflix. Assume that she will retire at the age of 65, having received an annual salary of \$200,000 per year, and that the interest rate is 2.9% compounded continuously. What is the accumulated future value of her earnings at her new job?

$$\int_0^{34} 200{,}000\, e^{.029t}\, dt = 200{,}000 \left[\frac{1}{.029} e^{.029t}\right]_0^{34}$$

$$= \frac{200{,}000}{.029}\left[e^{.029(34)} - e^{.029(0)}\right] = \frac{200{,}000}{.029}\left[2.68049 - 1\right]$$

$$\approx \$11{,}589{,}593^{35}$$

2.) D(x) is the price, in dollars per unit, that consumers will pay for x units of an item; S(x) is the price, in dollars per unit, that producers will accept for x units. Find the equilibrium point, the consumer surplus (labeled CS) and the producers surplus (labeled PS).

$D(x)=\frac{-5}{6}x+9 \qquad S(x)=\frac{1}{2}x+1$

EQ. PT: $(6, \$4.^{00})$

$$-\frac{5}{6}x + 9 = \frac{1}{2}x + \cancel{1}$$

$$+\frac{5}{6}x \quad -1 \quad +\frac{5}{6}x \quad -\cancel{1}$$

$$8 = \frac{4}{3}x$$

$$\frac{3}{6}x+\frac{5}{6}x=\frac{8}{6}x = \frac{4}{3}x$$

$$8\cdot\frac{3}{4} = \frac{\cancel{4}}{\cancel{3}}x\cdot\frac{\cancel{3}}{\cancel{4}} \quad 6$$

$$D(6) = \frac{-5}{6}(6)+9 = 4^{00}$$

CS: $$\int_0^6\left(\frac{-5}{6}x+9\right)dx - \left[(6)(4^{00})\right] = \left[\frac{-5}{6}\frac{x^2}{2}+9x\right]_0^6 - 24^{00} = 39-24 = \$15^{00}$$

PS: $$\left[(6)(4^{00})\right] - \int_0^6\left(\frac{1}{2}x+1\right)dx = 24^{00} - \left[\frac{1}{2}\cdot\frac{x^2}{2}+x\right]_0^6 = 24-15 = \$9^{00}$$

3.) Integrate using substitution: $\int (2t^5-3)^2\, t^4\, dt$

let $u = 2t^5-3$

$du = 10t^4\, dt$

$$\frac{1}{10}\int \underbrace{(2t^5-3)^2}_{u^2}\cdot \underbrace{t^4\cdot dt\cdot 10}_{du} = \frac{1}{10}\int u^2\, du = \frac{1}{10}\cdot\frac{u^3}{3}+C$$

$$= \frac{1}{30}(2t^5-3)^3 + C$$