First left @ 10
7 allotted hours out of 25

MATH 332
Quiz IV
October 19, 1990 Name KEY

(10) 1. Let u = (1,-2,4,1), v = (-1,2,1,0), w = (2,-3,1,0). Find (if possible):

a. u + 4v = $(1,-2,4,1) + (-4,8,4,0) = (-3,6,8,1)$

b. u·w = $(1,-2,4,1)\cdot(2,-3,1,0) = 2+6+4+0 = 12$

c. ‖u‖ = $\sqrt{1^2+(-2)^2+4^2+1^2} = \sqrt{22}$

d. Find a unit vector parallel to v. $\frac{1}{\|v\|}\vec{v} = \frac{1}{\sqrt{6}}(-1,2,1,0)$

e. u·(v·w) = not possible

5 2. Find the (orthogonal) projection of the vector u = (-2,2,0) onto the vector v = (2,-1,2). all but 4

$$\frac{u\cdot v}{v\cdot v}\cdot v = \frac{(-2,2,0)\cdot(2,-1,2)}{(2,-1,2)\cdot(2,-1,2)}(2,-1,2) = \frac{-6}{9}(2,-1,2)$$

$$= -\frac{2}{3}(2,-1,2)$$

$$= \left(-\frac{4}{3}, \frac{2}{3}, -\frac{4}{3}\right)$$

5 3. Give the equation of the plane in R^3 which contains (1,2,0) and is parallel to the plane x + 2y - 3z = 3. 2/3

$P_0 = (1,2,0)$
$\vec{n} = (1,2,-3)$

$(1,2,-3)\cdot(x-1, y-2, z) = 0$ point handed to you

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

$x+2y-3z-5=0$

or $x+2y-3z=5$ ← fraction

5 4. Find the equation(s) of the straight line through the point (2,0,-6) which is perpendicular to the plane x + 3y - z = 9. 2/20

$\vec{m}t + \vec{b}$

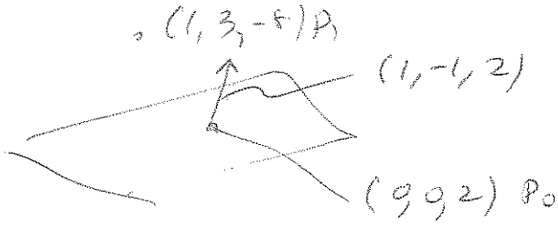
$\vec{m} = (1,3,-1)$ $\vec{b} = (2,0,-6)$

$\vec{r} = \vec{m}t + \vec{b} = t(1,3,-1) + (2,0,-6)$

$= (t+2, 3t, -t-6)$

or $x = t+2,\ y = 3t,\ z = -t-6$ 1/3

5 5. Find the distance from the point (1,3,-8) to the plane x - y + 2z = 4 1/2



$\overrightarrow{P_0P_1} = (1,3,-10)$

proj $\overrightarrow{P_0P_1}$ onto N,

$$\vec{p} = \frac{(1,3,-10)\cdot(1,-1,2)}{(1,-1,2)\cdot(1,-1,2)}(1,-1,2) = \frac{1-3-20}{6}(1,-1,2)$$

$$= -\frac{22}{6}(1,-1,2)$$

$$\|\vec{p}\| = \frac{22}{6}\sqrt{6} = \frac{22}{\sqrt{6}} = \frac{22\sqrt{6}}{6} = \frac{11}{3}\sqrt{6}$$