attend 20
1 pers alone at 15 (calls)
first left at 16 (calls)
bunch at 19 & 20

MATH 332
Quiz III
October 1, 1993

Name Key

1. Show that (1,5,-4) is in the span of (2,4,-2) and (2,3,-1) by writing it as a linear combination. Set up equations and solve. OR NOT

$$a_1(2,4,-2) + a_2(2,3,-1) = (1,5,-4)$$

$$\left[\begin{array}{cc|c} 2 & 2 & 1 \\ 4 & 3 & 5 \\ -2 & -1 & -4 \end{array}\right] \to \left[\begin{array}{cc|c} 2 & 2 & 1 \\ 0 & -1 & 3 \\ 0 & 1 & -3 \end{array}\right] \to \left[\begin{array}{cc|c} 2 & 2 & 1 \\ 0 & -1 & 3 \\ 0 & 0 & 0 \end{array}\right]$$

$a_2 = -3$

$2a_1 + 6 = 1 \quad 2a_1 = \frac{7}{4} \quad a_2 = \frac{7}{2}$

$\frac{7}{2}(2,4,-2) - 3(2,3,-1)$

2. The vectors (2,0,4) and (1,3,2) do not span R^3. Find the algebraic condition that the vector (x_1, x_2, x_3) must satisfy to be in the span of these vectors. (This will be the equation of the plane through (0,0,0) containing these vectors.)

$$\left[\begin{array}{cc|c} 2 & 1 & x_1 \\ 0 & 3 & x_2 \\ 4 & 2 & x_3 \end{array}\right] \to \left[\begin{array}{cc|c} 2 & 1 & x_1 \\ 0 & 3 & x_2 \\ 0 & 0 & x_3 - 2x_1 \end{array}\right]$$

y?

$x_3 - 2x_1 = 0 \quad x_3 = 2x_1$

(Some said $x_2 = 3$)

3. Verify that the set of vectors (x_1, x_2, x_3) for which $x_1 + x_2 + x_3 = 0$ is a subspace of R^3.

a1 $0+0+0=0$ ✓

c1 $x_1+x_2+x_3=0 \quad y_1+y_2+y_3=0$

$(x_1+y_1, x_2+y_2, x_3+y_3) \mapsto x_1+y_1+x_2+y_2+x_3+y_3$

$= x_1+x_2+x_3+y_1+y_2+y_3$

$= 0+0 = 0$ ✓

$r x_1 + r x_2 + r x_3$

$= r(x_1+x_2+x_3) = r0 = 0$

4. Show that the set of vectors (x_1, x_2) for which $x_1 = 0$ or $x_2 = 0$ is NOT a subspace of R^2.

$(0,0)$ ✓

$(1,0) + (0,1) = (1,1)$ not in set.

5. Find the quadratic polynomial which passes through the points (-1,2), (0,3), and (1,7). Set up equations, and solve.

$y = a + bt + ct^2$

$2 = a - b + c$

$3 = a$

$7 = a + b + c$

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & 2 \\ 1 & 0 & 0 & 3 \\ 1 & 1 & 1 & 7 \end{array}\right] \to \left[\begin{array}{ccc|c} 1 & -1 & 1 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 2 & 0 & 5 \end{array}\right] \to \left[\begin{array}{ccc|c} 1 & -1 & 1 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 2 & 3 \end{array}\right]$$

$c = \frac{3}{2} \quad b - \frac{3}{2} = 1 \quad b = \frac{5}{2}$

$a - \frac{5}{2} + \frac{3}{2} = 2 \quad a = 3$

$$y = 3 + \frac{5}{2}t + \frac{3}{2}t^2$$

2 free