MATH 3337 h-sr functions

SCALE & VECTOR FUNCTIONS AND FIELDS

1)

a) $y - y_0 = m(x - x_0)$

$y - 2 = \frac{4-2}{3-1}(x-1)$

$y = x + 1$

b) Let t go from 0 to 1

... as x goes from 1 to 3

$x - 1 = \frac{3-1}{1-0}(t - 0)$

$x = 2t + 1$

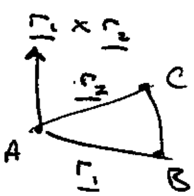
... as y goes from 2 to 4

$y - 2 = \frac{4-2}{1-0}(t - 0)$

$y = 2t + 2$

$\underline{r} = (2t+1, 2t+2)$

3)



Two sides define vectors.

$\underline{r}_1 \times \underline{r}_2$ = normal vector $= \underline{n}$

Plane $\Rightarrow$ $\underline{n} \bullet (\underline{r} - \underline{r}_0) = 0$

Let $\underline{r}_0$ be vector to A from origin

$\underline{r}_0 = \overrightarrow{OA} = (4, -3, 1)$

$\underline{r}_1 = \overrightarrow{AB} = (2, -1, 6)$

$\underline{r}_2 = \overrightarrow{AC} = (-3, 5, 1)$

$\underline{n} = \underline{r}_1 \times \underline{r}_2 = \begin{pmatrix} i & j & k \\ 2 & -1 & 6 \\ -3 & 5 & 1 \end{pmatrix} = (-31, -20, 7)$

$(-31, -20, 7) \cdot (x - 4, y + 3, z - 1) = 0$

$-31(x-4) - 20(y+3) + 7(z-1) = 0$

2) • let $x = t$

$\underline{r} = \langle t, 2t+1 \rangle$ $t = [0, 2]$

• let $x = t^2$ $t = [0, \sqrt{2}]$

$\underline{r} = \langle t^2, 2t^2+1 \rangle$

• let $x = at + b$ $t = [-\frac{b}{a}, \frac{2-b}{a}]$

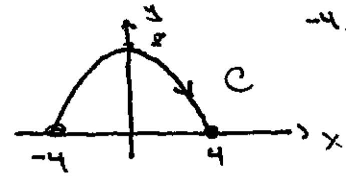
$\underline{r} = \langle at+b, 2(at+b)+1 \rangle$

etc etc

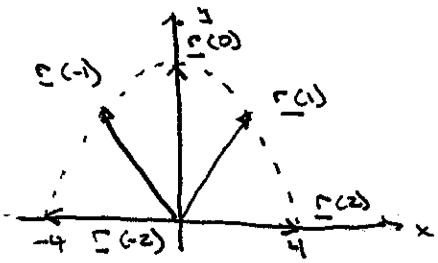
4) a) $x = 2t \Rightarrow t = \frac{x}{2}$

$y = 8 - 2t^2 = 8 - 2\left(\frac{x}{2}\right)^2 = 8 - \frac{x^2}{2}$

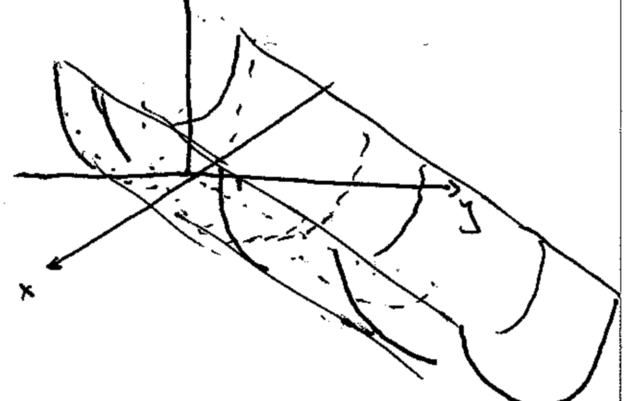
$-4 \le x \le 4$



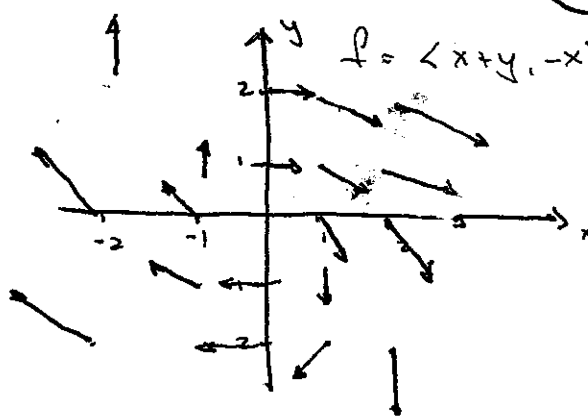
b)



6) a) $f = x^2 - y$



b) $f = \langle x+y, -x \rangle$



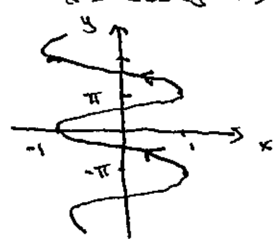
5) a) $r = \langle \cos t, t + \pi \rangle$

Eliminate t

$y = t + \pi$

$t = y - \pi$

$x = \cos(y - \pi)$



b) $\underline{r} = \langle e^t \cos t, e^t \sin t \rangle$

$x^2 + y^2 = e^{2t}$

Circle w/ radius e^t

$t \in [0, \pi]$ so only ½ circle