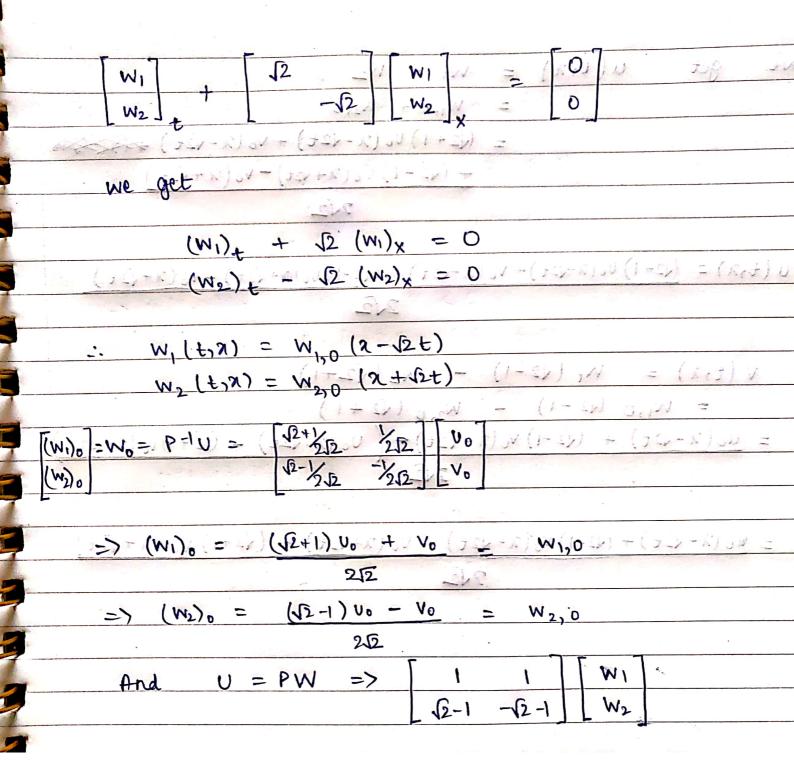
Problem - 3 Advection Ean Analytical Soln (system)  $u_t + u_x + v_x = 0$   $u(x,0) = u_0(x)$  $V_t + U_x - V_x = 0$   $V(x,0) = V_0(x)$ The system of equs can be written as 0 = (x,3) x (= I Ox A we diagonalize A = PNP-1 12-1-12-1 - 52 the system as Waiting Ut + AUx = 0  $= > PP^{-1}U_{+} + PNP^{-1}U_{x} = 0$ Suppose W=P-1U => Wt = P-1Ut, Wx = P-1Ux  $\Rightarrow$   $PW_{+} + PNW_{\times} = 0$  $\Rightarrow$  P(Wt + NWx) = 0 .. we need to solve Wt + VMX = 0 : P # 0



```
W1 + W2
                  u(Enn)
  we
          get
                               W1,0+ W2,0
                               (12+1) Vo (2-12t) + Vo (2-12t)
                               + (12-1) Uo (2+52t) - Vo (2+52t)
                                         2/2
 => u(t,x) = (2+1) vo(x-2t)+vo(x-2t)+(2-1) vo(x+(2t)-vo(x+(2t)
                                      2/2
                                -(-W2 (12+1)
        V(t_1x) = W_1(\sqrt{2}-1)
 and
                            - W2,0 (12+1)
            = W_{1,0} (\sqrt{2}-1)
       = uo(x-12t) + (12-1) vo(x-12t) - ( Uo (x+12t) - (12+1) vo (x+12t)
                                22
       = 40 (2-12t)+ (12-1) vo (2-12t) = 00 (2+12t) = (12+1) vo (2+12t)
v(t,2)
                               2/2
```