

apply
$$\Phi(B)^{-1}$$
 to both sides, we obtain $y_t = \Phi(B)^{-1}S + \Phi(B)^{-1}Et$

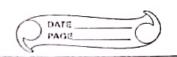
$$U_{t} = u + \psi(B) \mathcal{E}_{t}$$
where $u = \Phi(B)^{-1} \mathcal{S}$

$$\Psi(B) = \Phi(B)^{-1}$$

and

$$\mathcal{L} = \overline{\Phi(B)} - 1 \mathcal{E}$$

$$\Phi(B)^{-1} = \underbrace{\$ \psi_{:}B_{:}}_{:=0} = \psi(B)$$



Now, we use eqn (6) to obtain the weights in Eqn (9) in terms of ϕ_1 and ϕ_2 .

For that, we use

$$\Phi(B) \mathbf{Y}(B) = 1$$

-(7)

i.e

prop(B)

 $(1-\phi_{1}B-\phi_{2}B^{2})(\Psi_{0}+\Psi_{1}B+\Psi_{2}B^{2}+--)=1$

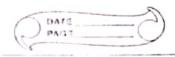
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ψο + (Ψ1 - Φ1 μ0) B + (π5 - Φ1 μ1 - Φ3 μ8) B3

+ - - + (4; - \$14; - \$4; 2) B) +-- = 1

-8

on RHS of egr (8) there are no backshift operators, for \$(B) Y(B)=1, we need $(\psi_1 - \phi_1 \psi_0) = 0$ $(\Psi_2 - \phi_1 \psi_1 - \phi_2 \psi_0)^- = 0$ $(\psi_{j} - \phi_{1} \psi_{j-1} - \phi_{2} \psi_{j-2}) = 0$ for all j = 2, 3, we can solve above eqn (9)
to estimate infinitely many parameters But egra y; in egr (3) Satisfy the second-order linear difference equation



Now, we can expressed it in termy of two roots m, and m, of the associated polynomial

$$(\psi_{2} - \phi_{1}\psi_{1} - \phi_{2}\psi_{6}) = 0$$

$$\downarrow \qquad \qquad \downarrow$$

$$m^{2} - \phi_{1}m - \phi_{2} = 0 \qquad -0$$

If the roots obtained by

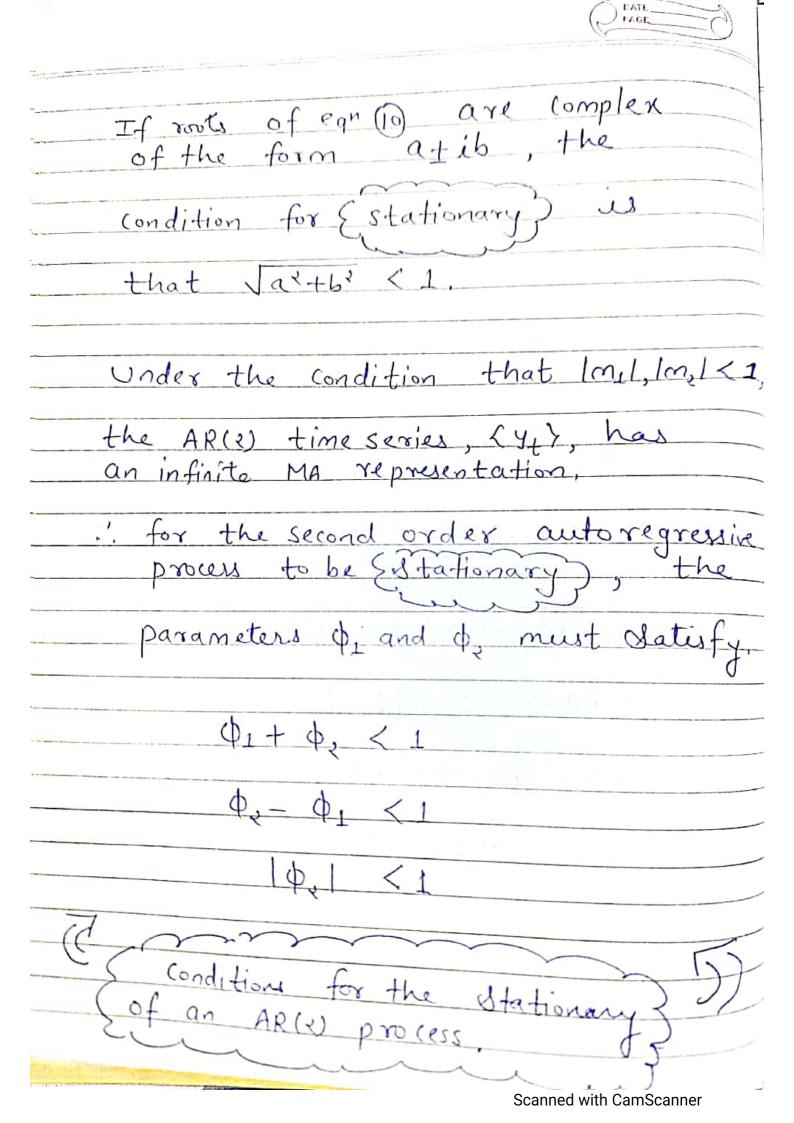
$$m_1, m_2 = \frac{\phi_1 + \sqrt{\phi_1^2 + 4\phi_2}}{2}$$

Satisfy Im, I, Im; I < 1 then

we have \tilde{z} | ψ_i | < ∞ .

Hence if the roots my and my

then the AR(2) model is Causal and stationary.





=> The mean of a stationary AR(2) (=

from eqn 1

It = S + p1 yt-1 + py yt-2 + Et

Taking expectations on both sides of above ego

 $E(y_t) = E(S) + \phi_1 E(y_{t-1}) + \phi_2 E(y_{t-2}) + E(\xi_t)$

 $u = S + \phi_1 u + \phi_2 u + 0$

u- 0, u- 0, u = S

 $M(1-\phi_1-\phi_2)=\delta$

mean of AR(x) process.