dS = lambda - lambda\*S +

mu\_wt\*eta\*Wc + mu\_r1\*eta\*Rc1 + mu\_r2\*eta\*Rc2 + mu\_r3\*eta\*Rc3 +

P1\*theta + P2\*theta + P3\*theta +

Pr\*rho\*(R1+R2+R3)\*Wc +

Pr\*(R2+R3)\*Rc1 + Pr\*(R1+R3)\*Rc2 + Pr\*(R1+R2)\*Rc3 -

Pr\*(R1+R2+R3)\*S -

beta\*S\*(Wc + Wi) - beta\*S\*(Ri1 + Rc1)\*fc1 - beta\*S\*(Ri2 + Rc2)\*fc2 - beta\*S\*(Ri3 + Rc3)\*fc3 +

tau\*(R1+R2+R3)\*Wi + tau\*(R2+R3)\*Ri1 + tau\*(R1+R3)\*Ri2 + tau\*(R1+R2)\*Ri3

dWc = -lambda\*Wc - mu\_wt\*eta\*Wc + mu\_wt\*Wi - Pr\*(R1+R2+R3)\*Wc -

beta\*S\*(Wc + Wi)\*psi + kappa\*(Rc1 + Rc2 + Rc3)

dWi = -lambda\*Wi- mu\_wt\*Wi - tau\*(R1+R2+R3)\*Wi + beta\*S\*(Wc + Wi)\*(1-psi)

dRc1 = -lambda\*Rc1 - mu\_r1\*eta\*Rc1 + mu\_r1\*Ri1 + Pr\*R1\*(1-rho)\*Wc - Pr\*(R2+R3)\*Rc1 +

beta\*S\*(Ri1 + Rc1)\*psi\*fc1 - kappa\*Rc1 + Pr\*R1\*(1-rho)\*S

dRi1 = -lambda\*Ri1 - mu\_r1\*Ri1 - tau\*(R2 + R3)\*Ri1 + beta\*S\*(Ri1 + Rc1)\*(1-psi)\*fc1

dRc2 = -lambda\*Rc2 - mu\_r2\*eta\*Rc2 + mu\_r2\*Ri2 + Pr\*R2\*(1-rho)\*Wc - Pr\*(R1+R3)\*Rc2 +

beta\*S\*(Ri2 + Rc2)\*psi\*fc2 - kappa\*Rc2 + Pr\*R2\*(1-rho)\*S

dRi2 = -lambda\*Ri2 - mu\_r2\*Ri2 - tau\*(R1 + R3)\*Ri2 + beta\*S\*(Ri2 + Rc2)\*(1-psi)\*fc2

dRc3 = -lambda\*Rc3 - mu\_r3\*eta\*Rc3 + mu\_r3\*Ri3 + Pr\*R3\*(1-rho)\*Wc - Pr\*(R1+R2)\*Rc3 +

beta\*S\*(Ri3 + Rc3)\*psi\*fc3 - kappa\*Rc3 + Pr\*R3\*(1-rho)\*S

dRi3 = -lambda\*Ri3 - mu\_r3\*Ri3 - tau\*(R1 + R2)\*Ri3 + beta\*S\*(Ri3 + Rc3)\*(1-psi)\*fc3

dP1 = -lambda\*P1 + Pr\*R1\*rho\*S - P1\*theta

dP2 = -lambda\*P2 + Pr\*R2\*rho\*S - P2\*theta

dP3 = -lambda\*P3 + Pr\*R3\*rho\*S - P3\*theta