33410:

Task. Hi Can any expert help by defining Jacobian of a matrix and making Jacobian of the following equations.

P=c(u+g+d)/(b^2+(u+d)(u+g+d))

>L=(b/u+g+d)^2.P

>S=(g/(j+u+d))[b/(u+g+d)]^2.P

>Q=(gj/(u+d)(j+u+d))[(b/(u+g+d))^2]P

the Author had found it to be J(P,L,S,Q)=(-a -b 0 0)

(c -b 0 0)

(0   g -d 0)

(0   0 j -e) Where

a=(2(u+d)(u+g+d)+b^2)/2(u+g+d)

b=(u+g+d)/2

c=b^2/2(u+g+d)

d=u+j+d

e=(d+u)

But it is difficult for me to understand it.Please give directions towards the solution.

Solution.
Suppose functions P, L, S,Q are the functions of arguments u,g,d, j. Find the partial derivative $P_u = \frac{\partial P}{\partial u}$ of function P with respect to u (differentiate P with respect to u while arguments g,d, j are considered to be constant). Find other partial derivatives $P_g = \frac{\partial P}{\partial g}$, P_d , P_j , L_u , L_g , L_d , L_j , S_u ,S_g , S_d , S_j , Q_u , Q_g , Q_d , Q_j. Compose matrix

$$\begin{pmatrix} P_u & P_g & P_d & P_j \\ L_u & L_g & L_d & L_j \\ S_u & S_g & S_d & S_j \\ Q_u & Q_g & Q_d & Q_j \end{pmatrix}$$

and calculate its determinant, which is called Jacobian.