**a)**

As given by the question:

(1)

(2)

replacing y in (1) with (2) results:

as , and , given the assumption that , we get

**b)**

let

, therefore,

**c)**

(3)

replace y in (1) with (3), we get

compare model with model , it can be seen that

therefore,

Because

Therefore, and

**d)**

note that for model , we estimate as . It can be seen that if we replace with , with , for column in , it is the same as the coefficients by regressing the column in , i.e., column in P can be obtained by regressing on column in respectively (Age, Educ, Parttime).

**e)**

According to d), we get

f)

, therefore

which is almost identical to regarding the numerical values.