

CSC 384 - A4 Q3

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Let's first consider a case where we have Separation but no Sufficiency. Let's look at when we consider $P(\text{Vegetables} \mid \text{Hyperlipidemia}, \text{BMI})$:

Vegetable	Hyperlipidemia	BMI	$P(V H,B)$
<400g/d	NO	24.0	0.283
400-500g/d	NO	24.0	0.324
>500g/d	NO	24.0	0.393
<400g/d	NO	18.5	0.283
400-500g/d	NO	18.5	0.324
>500g/d	NO	18.5	0.393
<400g/d	NO	28.0	0.283
400-500g/d	NO	28.0	0.324
>500g/d	NO	28.0	0.393
<400g/d	NO	<18.5	0.283
400-500g/d	NO	<18.5	0.324
>500g/d	NO	<18.5	0.393
<400g/d	YES	24.0	0.579
400-500g/d	YES	24.0	0.284
>500g/d	YES	24.0	0.137
<400g/d	YES	18.5	0.579
400-500g/d	YES	18.5	0.284
>500g/d	YES	18.5	0.137
<400g/d	YES	28.0	0.579
400-500g/d	YES	28.0	0.284
>500g/d	YES	28.0	0.137
<400g/d	YES	<18.5	0.579
400-500g/d	YES	<18.5	0.284
>500g/d	YES	<18.5	0.137

The relation $P(\text{Hyperlipidemia} \mid \text{Vegetables}, \text{BMI}) = P(\text{Hyperlipidemia} \mid \text{Vegetables})$ does not hold up however, proving that it's not sufficient.

Similarly we can find a relation where we have Sufficiency hold but not Separation.