

Causation

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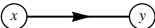
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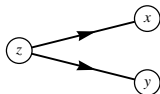
The ways in which two variables may have strong correlation are:

I. Simple Causality 

II. Reverse Causality 

III. Mutual Causality 

IV. Hidden/Confounding Variable



V. Complete Accident/Coincidence



Simple Causality

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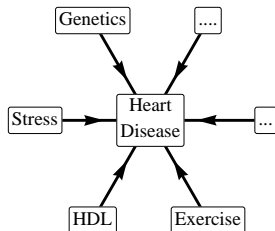
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Many factors have been determined that increase the chance for heart disease.



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Healthy people had body lice and sick people didn't.

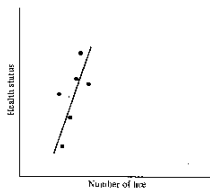


Figure 7

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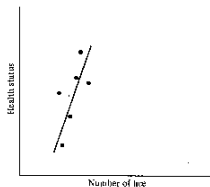


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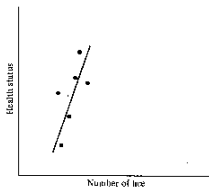


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Example. Human birth rate and stork population:

Storks bring babies.

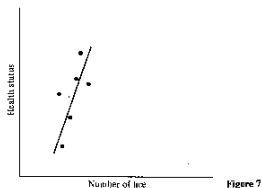


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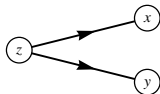
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These are mutually reinforcing. This is an example of mutual causality.

Hidden Variable Causes Both

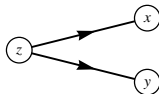
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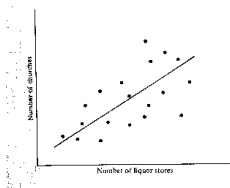
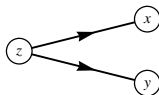


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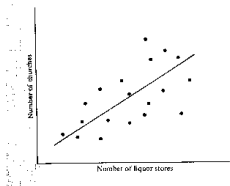
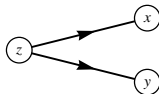


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- ▶ Reverse causation would imply:

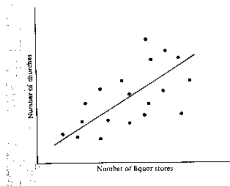
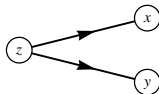


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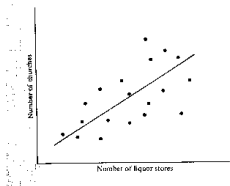


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In this instance, there is a confounding variable: _____.

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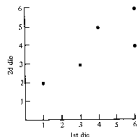
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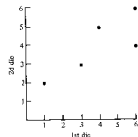
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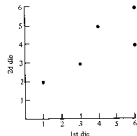
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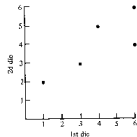
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- The chance of this occurring decreases as more observations are taken.

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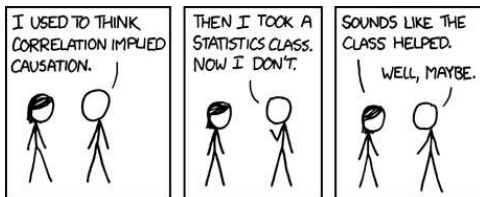


Correlation does not imply causation!

Groupwork: Justify the correlations between the following variables:

- ▶ As ice cream sales increase, the rate of drowning deaths increase.
- ▶ The more firemen fighting the fire, the larger the fire grows.
- ▶ With fewer pirates on the open seas, global warming has increased.
- ▶ The more people in my Facebook group, the faster it grows.

What is the joke below?



Source: <http://xkcd.com/552/>