Probability of purchase for randomly selected customer:
Pr\{Milk\} = 0.5 \quad Pr\{Cereal\}=0.3 \quad Pr\{Both\}=0.2

Rule: Cereal \Rightarrow Milk \ “A person who buys cereal will buy milk”

**Support** of rule is Pr\{Both\} = Pr\{Cereal and Milk\} = 0.20 = 20%

**Confidence** of the rule is Pr\{Milk|Cereal\}=2/3

Recall: Pr\{Milk|Cereal\} is read as “the probability of milk given cereal” so it is the proportion of milk purchasers from among the cereal purchasers. That is 0.20/0.30. We expect that out of every 100 people, 30 on average will purchase cereal and of those, 20 will purchase milk. In general this is the probability of both divided by the probability of the event to the right of the bar |.

Pr\{Milk|Cereal\}=Pr\{Milk and Cereal\}/Pr\{Cereal\}
You’re thinking about putting a milk flier in the cereal aisle. Does it seem like cereal buyers are more likely to purchase milk than the average shopper? In our sample, half of the customers buy milk so the expected proportion of milk purchasers in any randomly selected group would be 1/2. This is the expected confidence under the hypothesis that buying cereal is not predictive of buying milk. If the group is cereal purchasers rather than a random group, then 2/3 of them buy milk so the “lift” that you get by marketing to cereal purchasers is 2/3 divided by 1/2 or 1.333. Sometimes this is reported as a 33.3% gain.

Lift of the rule is: confidence / (expected confidence)= Pr{Milk|Cereal} / Pr{Milk}

Question: is the support for the rule Cereal=>Milk the same as that for the rule Milk=>Cereal? How about the confidence and lift?

Computation of these quantities is a simple matter of counting and taking proportions but with hundreds of items and thousands of shopping carts (think of a grocery store chain) turning this over to a computer would be helpful. Further you would probably want to only show the best few results so sorting on descending lift or confidence and deleting rules with little support would be desirable.