4) Create decision tree for above data using entropy and information gain

1.Calculate the entropy of the entire dataset based on the target variable "Buys Computer." We have 9 examples where Buys Computer = No and 7 examples where Buys Computer = Yes. So the entropy is:

In [2]:
```
Entropy(S) = -9/16 * log2(9/16) - 7/16 * log2(7/16) = 0.9887
```

2.Calculate the information gain for each attribute:

Student:

In [ ]:
```
Entropy(S, Student=Yes) = -2/6 * log2(2/6) - 4/6 * log2(4/6) = 0.9183
Entropy(S, Student=No) = -7/10 * log2(7/10) - 3/10 * log2(3/10) = 0.8813
Information Gain(Student) = Entropy(S) - (6/16 * Entropy(S, Student=Yes) + 10/
```

Income

In [ ]:
```
Entropy(S, Income=High) = -4/7 * log2(4/7) - 3/7 * log2(3/7) = 0.9852
Entropy(S, Income=Medium) = -2/4 * log2(2/4) - 2/4 * log2(2/4) = 1
Entropy(S, Income=Low) = -3/5 * log2(3/5) - 2/5 * log2(2/5) = 0.971
Information Gain(Income) = Entropy(S) - (7/16 * Entropy(S, Income=High) + 4/16
Entropy(S, Income=Low)) = 0.0481
```

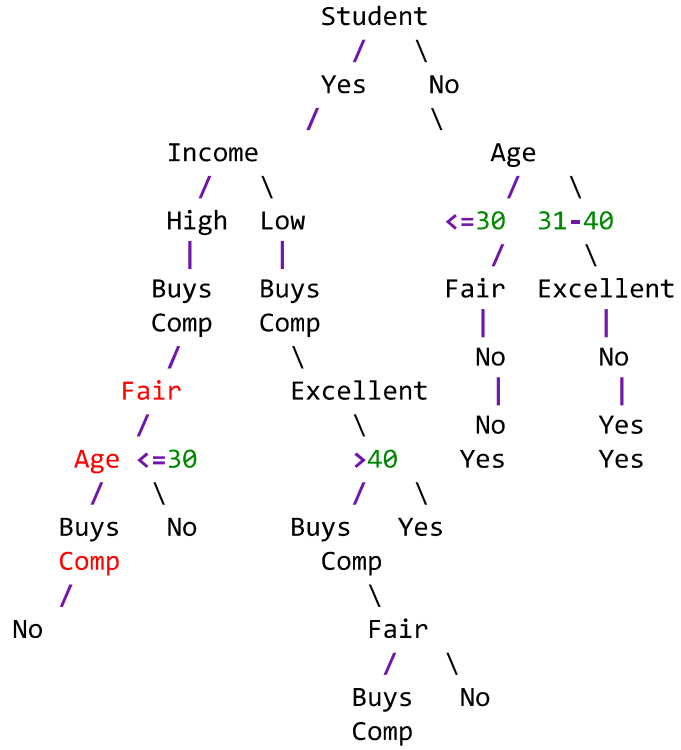
Age:

In [ ]:
```
Entropy(S, Credit Rating=Fair) = -6/10 * log2(6/10) - 4/10 * log2(4/10) = 0.97
Entropy(S, Credit Rating=Excellent) = -1/6 * log2(1/6) - 5/6 * log2(5/6) = 0.6
Information Gain(Credit Rating) = Entropy(S) - (10/16 * Entropy(S, Credit Rati
```

Credit Rating:

In [ ]:
```
Entropy(S, Credit Rating=Fair) = -6/10 * log2(6/10) - 4/10 * log2(4/10) = 0.97
Entropy(S, Credit Rating=Excellent) = -1/6 * log2(1/6) - 5/6 * log2(5/6) = 0.6
Information Gain(Credit Rating) = Entropy(S) - (10/16 * Entropy(S, Credit Rati
Entropy(S, Credit Rating=Excellent)) = 0.3113
```

3)Create all possible decision tree on paper for below data

In [ ]:


In [ ]:

In [ ]:

In [ ]:

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In [ ]: