1. (5 pts) Classify using Naïve Bayes method on the titanic dataset the data items:

```
2nd     child   male    ?
2nd     adult   female  ?
```

You can use a spreadsheet to compute the counts.

2nd , child , male , Survived. ?

$$P(\text{Survived} = \text{Yes} \mid E) = P(\text{pClass} = 2\text{nd} \mid \text{survived} = \text{Yes})^* P(\text{age} = \text{child} \mid \text{Survived} = \text{Yes})^* P(\text{sex} = \text{male} \mid \text{survived} = \text{Yes})^* P(\text{Survived} = \text{Yes}) / P(E)$$

$$= (118/711)^* (57/711)^* (367/711)^* (711/2201) / P(E) = 0.002219 / P(E)$$

$$P(\text{Survived} = \text{No} \mid E) = P(\text{pClass} = 2\text{nd} \mid \text{survived} = \text{No})^* P(\text{age} = \text{child} \mid \text{Survived} = \text{No})^* P(\text{sex} = \text{male} \mid \text{survived} = \text{No})^* P(\text{Survived} = \text{No}) / P(E)$$

$$= (167/1490)^* (52/1490)^* (1364/1490)^* (1490/2201) / P(E) = 0.002424 / P(E)$$

$$P(E) = 0.002219 + 0.002424 = 0.004643$$

So,

$p(\text{survived} = \text{Yes} \mid E) = 0.002219 / 0.004643 = 47.79\%$

$p(\text{survived} = \text{No} \mid E) = 0.002424 / 0.004643 = 52.21\%$

2nd, adult, female, survived ?

$p(\text{Survived} = \text{Yes} \mid E) = p(\text{pClass} = 2\text{nd} \mid \text{survived} = \text{Yes})^* p(\text{age} = \text{adult} \mid \text{Survived} = \text{Yes})^* p(\text{sex} = \text{female} \mid \text{survived} = \text{Yes})^* p(\text{Survived} = \text{Yes}) / p(E)$

$= (118/711)^* (654/711)^* (344/711)^* (711/2201) / p(E) = 0.023859 / p(E)$

$p(\text{Survived} = \text{No} \mid E) = p(\text{pClass} = 2\text{nd} \mid \text{survived} = \text{No})^* p(\text{age} = \text{adult} \mid \text{Survived} = \text{No})^* p(\text{sex} = \text{female} \mid \text{survived} = \text{No})^* p(\text{Survived} = \text{No}) / p(E)$

$= (167/1490)^* (1438/1490)^* (126/1490)^* (1490/2201) / p(E) = 0.006192 / p(E)$

$p(E) = 0.023859 + 0.006192 = 0.030052$

$P(\text{survived} = \text{Yes} \mid E) = 0.023859 / 0.030052 = 79.39\%$

$P(\text{survived} = \text{No} \mid E) = 0.006192 / 0.030052 = 20.61\%$

Q2 - attached notebook or pdf

Q3 - attached notebook or pdf