Problem 12.2

Calculating the Probabilities using formula:

Probability=ODDS/(ODDS+1)

ODDS	P
0.25	0.2
0.5	0.33
1.0	0.5
1.5	0.6
2.0	0.66
2.5	0.71
3.0	0.75
5.0	0.83

Problem 12.3

Disease A

SMOKING	YES	NO	TOTAL
YES	80	120	200
NO	20	280	300
TOTAL	100	400	500

P(Smoker getting Disease A) = Smokers with Disease A / Total Smokers = 80 / 200 = 0.4

ODDS(Smoker getting Disease A) = P(Smoker getting Disease A) / (1- P(Smoker getting Disease A)) = 0.4 / 0.6 = 0.667

P(Non-Smoker getting Disease A) = Non-Smokers with Disease A / Total Non-Smokers = 20 / 300 = 0.0667

ODDS(Non-Smoker getting Disease A) = P(Non-Smoker getting Disease A) / (1- P(Non-Smoker getting Disease A)) = 0.0667 / 0.993 = 0.0714

ODDS RATIO = ODDS(Smoker getting Disease A) / ODDS(Non-Smoker getting Disease A) = 0.667 / 0.0714 = 9.3417

Problem 12.4

Code:

```
#Binary encoding of fev1father as per the condition
ak1<-subset(Lung_Function,fev1father<=409)
ak1$value<-0
ak2<-subset(Lung_Function,fev1father>409)
ak2$value<-1
dataset1<-rbind(ak1,ak2)

#Logistic regression model
model<-glm(value~FAGE+FHEIGHT+WEIGHTF+FFVC, data = dataset1, family = "binomial")
model
summary(model)
```

Output:

```
Call:  glm(formula = value ~ FAGE + FHEIGHT + WEIGHTF + FFVC, family = "binomial",
    data = dataset1)

Coefficients:
(Intercept)         FAGE      FHEIGHT      WEIGHTF         FFVC
  -40.69072      0.03663      0.29236     -0.01976      0.04549

Degrees of Freedom: 149 Total (i.e. Null);  145 Residual
Null Deviance:      207.8
Residual Deviance: 83.71        AIC: 93.71

Call:
glm(formula = value ~ FAGE + FHEIGHT + WEIGHTF + FFVC, family = "binomial",
    data = dataset1)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-3.3373  -0.3665  -0.0196   0.3933   1.8596

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -40.690721   9.890850  -4.114 3.89e-05 ***
FAGE          0.036632   0.042386   0.864   0.3875
FHEIGHT       0.292359   0.146656   1.993   0.0462 *
WEIGHTF      -0.019765   0.013250  -1.492   0.1358
FFVC          0.045490   0.008324   5.465 4.63e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 207.837  on 149  degrees of freedom
Residual deviance:  83.707  on 145  degrees of freedom
AIC: 93.707

Number of Fisher Scoring iterations: 6
```