

2.(A)(B)(C)

2.  
(a) 可以設  $RACE_2, RACE_3$  兩個 variable, 為 dummy variable  
 然後把  $RACE$  為 0 的設為  $RACE_2 = 0$   
 $RACE_3 = 0$

$RACE$  為 1 的設為  $RACE_2 = 1$   
 $RACE_3 = 0$

$RACE$  為 2 的設為  $RACE_2 = 0$   
 $RACE_3 = 1$

(b) equation for the logistic regression:  

$$\pi(x) = \frac{e^{\beta_0 + \beta_1 AGE + \beta_2 CAN + \beta_3 CPR + \beta_4 INT + \beta_5 RACE_2 + \beta_6 RACE_3}}{1 + e^{\beta_0 + \beta_1 AGE + \beta_2 CAN + \beta_3 CPR + \beta_4 INT + \beta_5 RACE_2 + \beta_6 RACE_3}}$$

equation for the logit transformation of the logistic regression model:

$$g(x) = \beta_0 + \beta_1 AGE + \beta_2 CAN + \beta_3 CPR + \beta_4 INT + \beta_5 RACE_2 + \beta_6 RACE_3$$

共有 7 個 parameters to estimate

只有 1 個 likelihood equation  $\rightarrow$  typical likelihood equation

(c) likelihood: 
$$l(\beta) = \prod_{i=1}^n \pi(x_i)^{y_i} (1 - \pi(x_i))^{1-y_i}$$
  
 where  $y_i = 1$  if  $STA = 1$  and  $y_i = 0$  otherwise

$$\log \text{likelihood} = \log(l(\beta)) = \sum_{i=1}^n (y_i \log(\pi(x_i)) + (1 - y_i) \log(1 - \pi(x_i)))$$

從 SAS 跑的数据可以看出  $\beta_0 = -3.5115$ ,  $\beta_1 = 0.0271$ ,  $\beta_2 = 0.2445$

$\beta_3 = 1.6465$ ,  $\beta_4 = 0.6807$ ,  $\beta_5 = -0.9571$

$\beta_6 = 0.2597$

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-3.5115	0.8144	18.5902	<.0001
AGE		1	0.0271	0.0116	5.4777	0.0193
CAN		1	0.2445	0.6168	0.1571	0.6918
CPR		1	1.6465	0.6234	6.9754	0.0083
INF		1	0.6807	0.3804	3.2015	0.0736
RACE	2	1	-0.9571	1.0845	0.7788	0.3775
RACE	3	1	0.2597	0.8713	0.0889	0.7656