Q4 :

(a) [A]

(b) [A]

(C) for this reason, we start writing the "Analysis of Deviance" table. we have factor variables that create (L-1) coefficients. L is number of levels in that factor variable.

	Res-Df	Res.Dev	Df	Deviance	Pr(>chi)
mod 0	736	832.28	14	15.04	P
mod 1	750	847.32			

⇒ based on Appendix table, Chi-square score of 5% is 23.68. So we can't reject the null hypothesis. Hence, m1 is an adequate simplification of m0

we repeat the test:

	Res - Df	Res.Dev	Df	Deviance	Pr(>chi)
mod 1	750	847.32	1	3.21	p
mod 2	751	850.53			

based on Appendix table, p is larger than 5% So we can't reject the null hypothesis. Hence, m2 is an adequate simplification of m1.

For m3:

	Res.Df	Res.Dev	Df	Deviance	Pr(>chi)
mod 2	751	850.53	1	0.03	p
mod 3	752	850.56			

⇒ we can't reject the null hypothesis ⇒ m3 is a simplification of m2

for m4:

	Res.Df	Res.Dev	Df	Deviance	Pr(>chi)
mod 3	752	850.56	2	7.77	p
mod 4	754	858.33			

⇒ based on table, p is less than 5%, So we reject the null hypothesis.

⇒ m4 is not an adequate simplification of m3.

Test the rest of models with m3:

	Res. Df	Res-Dev	Df	Deviance	Pr(>chi)
mod 3	752	850.56			
mod 5	756	864.09	4	13.53	reject H_0
mod 6	757	867.82	5	17.26	reject H_0
mod 7	758	940.66	6	90.1	reject H_0

⇒ m3 is an adequate simplification of m0 and we can't simplify it more.

(d) $\log\left(\frac{M}{1-M}\right) = \beta_0 + \beta_1(\text{bmi}) + \beta_2(\text{age}) + \beta_3(\text{diastolic})$

$\Rightarrow \dfrac{\text{odds of diabetes with (age+1)}}{\text{odds of diabetes with (age)}} = e^{\beta_2} = 1.04$

$\Rightarrow$ if age is increasing by 1 unit, the odds of getting diabetes increases by factor of 1.04.

(e) $\beta_2 \pm 1.96(\text{Standard. Error } \beta_2) \Rightarrow CI = \left[e^{\beta_2 - 1.96 Se(\beta_2)}, e^{\beta_2 + 1.96 Se(\beta_2)}\right]$

$0.0346 \qquad 0.0625$

$\Rightarrow [1.035 \ , \ 1.06]$

(f) based on lecture notes, the χ^2_{n-p} approximation makes sense only under H_0 when the grouped format is used.

Since we don't know the format of data entry, we can't tell if we can use goodness of fit test with χ^2_{756}. ~~A~~ C

(g) A