UNIT 9 HOMEWORK

The following table comes from a paper that examined the relationship between the duration of breast feeding as an infant and the presence of overweight or obesity at age 18 years (in men). (The "p-value for linear trend" was calculated by running a logistic regression model that included breastfeeding duration as an ordinal variable—coded as: 1,2,3,4,5.)

Table 7. Logistic regression analyses for prevalence of overweight and obesity among 18 year old men according to duration of predominant breast feeding (n=1993).

Odds ratio (95% CI) according to duration of predominant breast feeding (months)

Outcomes	Model	<1	1-1.9	2-2.9	3-3.9	>=4	P value for linear trend
Overweight	Crude	1.03 (0.67 to 1.58)	0.96 (0.60 to 1.56)	0.76 (0.47 to 1.23)	0.89 (0.58 to 1.38)	1.0	0.62
	Adjusted*	1.05 (0.69 to 1.58)	0.82 (0.51 to 1.32)	0.86 (0.55 to 1.34)	0.82 (0.54 to 1.25)	1.0	0.56
Obese	Crude	1.43 (0.82 to 2.49)	1.12 (0.60 to 2.10)	0.94 (0.50 to 1.74)	0.87 (0.49 to 1.56)	1.0	0.03
	Adjusted*	1.42 (0.79 to 2.56)	1.14 (0.59 to 2.22)	1.02 (0.53 to 1.94)	0.80 (0.43 to 1.48)	1.0	0.03

* Adjusted for family income and maternal education at birth, maternal body mass index, skin colour, birth weight, gestational age, maternal smoking during pregnancy, and current behaviourable variables (smoking, alcohol drinking, type of diet, and physical exercise).

Reprinted with permission from: Victora CG et al. Anthropometry and body composition of 18 year old men according to duration of breast feeding: birth cohort study from Brazil. *BMJ* 2003;327:901, Table 7.

Question 1:

Breastfeeding was treated as a categorical variable. What was used as the reference group?

1. no breastfeeding
2. predominant breastfeeding of at least 4 months
3. predominant breastfeeding less than 1 month
4. predominant breastfeeding of at least 1 year

Question 2:

How should we interpret the crude odds ratio for obesity for men breastfed less than 1 month: 1.43 (0.82 to 2.49)?

1. Breastfeeding for less than 1 month was associated with a non-significant 43% increase in the odds of being obese at 18 years, compared with breastfeeding at least 4 months.

2. Breastfeeding for less than 1 month was associated with a significant 43% increase in the odds of being obese at 18 years, compared with breastfeeding at least 4 months.
3. Breastfeeding for less than 1 month was associated with a significant 43% increase in the likelihood of being obese at age 18 years, compared with breastfeeding at least 4 months.
4. Breastfeeding for less than 1 month was associated with a non-significant 143% increase in the odds of being obese at 18 years, compared with breastfeeding at least 4 months.

Question 3:

TRUE or FALSE. The variables that the authors adjusted for (income, maternal education at birth, maternal BMI, skin color, birth weight, gestational age, maternal smoking during pregnancy and current smoking, alcohol, diet, and exercise) appear to be strong confounders of the relationship between breastfeeding duration and weight at age 18.

1. True
2. False

Researchers sought to find predictive factors for mortality after discharge from an intensive care unit (a binary outcome). The following Table gives their final logistic regression model predicting mortality. The area under the curve for this model is 86%.

TABLE 3. Multiple logistic regression analysis for discharge triage predictive model*

Variable	β (SE)	P value
Age	0.0532 (0.0094)	<0.0001
Chronic health points	0.2501 (0.0728)	0.0006
Acute physiology points	0.1556 (0.0300)	<0.0001
Cardiac surgery	-2.1084 (0.2712)	<0.0001
Length of ICU stay	0.0447 (0.0153)	0.0034
Intercept	-4.5821 (0.6825)	<0.0001

*Variables considered in models: acute physiology points (APP), length of stay on unit, therapeutic intervention score, duration (days) on mechanical ventilation, dialysis, age, presence of chronic ill health, and number of failing organs. APP used in preference to APACHE II score because APACHE II is dirived from APP, age points, chronic ill health points, and presence or absence of emergency surgery.

(Reproduced with permission from: Kathleen Daly, R Beale, R W S Chang. Reduction in mortality after inappropriate early discharge from intensive care unit: logistic regression triage model. *BMJ* 2001;322:1274.)

Question 4:

The beta coefficient for cardiac surgery is negative. What does this mean?

1. Patients who had cardiac surgery were less likely to die after discharge than patients with other conditions.
2. Patients who had cardiac surgery were more likely to die after discharge than patients with other conditions?
3. It cannot be determined.

Question 5:

Translate the beta coefficient of 0.2501 (for chronic health points) into an odds ratio. Round to two decimal places.

Question 6:

The odds ratio for "length of ICU stay" is 1.046 (because: exp(.0447)=1.046). This odds ratio is very close to the null value of 1.0, yet it is highly statistically significant. How can this be?

1. This is an example of a statistically significant, but not clinically meaningful effect.
2. The odds ratio gives the change in odds for every 1-day increase in ICU stay, which is a small unit of change.
3. The authors must have made a transcribing error.

Question 7:

The beta coefficient for age (in years) is .0532. What is the odds ratio for a 10-year increase in age? Round to 2 decimal places.

Question 8:

What is the goal of this particular logistic regression model?

1. To find a combination of variables that identifies the patients most likely to die after discharge.
2. To adjust for confounders.
3. To test for interaction.
4. To account for correlated data.

Question 9:

The final logistic regression model is:

logit(death)=-4.5821+0.0447*(length of ICU stay)-2.1084*(cardiac surgery, yes=1/no=0)+0.1556*acute physiology points+0.2501*chronic health points+0.0532*age.

What is the predicted probability of death for a patient who stays in the ICU 10 days, is NOT a cardiac surgery patient, has an acute physiology score of 1, has a chronic health score of 1, and is 50 years old?

1. 78%
2. 100%
3. 0%
4. 67%
5. 26%

Question 10:

In including continuous predictors in the model (e.g., age, length of ICU stay), what assumption are the authors making?

1. these predictors must be normally distributed
2. these predictors have a linear relationship with the logit of death
3. these predictors meet proportional hazards
4. these predictors have homogenous variances

The following table comes from a prospective cohort study that examined the effect of mid-life weight on dementia.

Table 3 Cox proportional hazards model of body mass index at mid-life and risk of dementia. Figures are hazard ratios (95% confidence intervals)

Body mass index*	Adjusted for age at mid-life exam and education	Also adjusted for age at diagnosis, race, marital status, sex	Also adjusted for mid-life and late life comorbidity**
All			
Obese	1.38 (1.10 to 1.72)	1.56 (1.24 to 1.96)	1.74 (1.34 to 2.26)
Overweight	1.16 (1.01 to 1.34)	1.22 (1.04 to 1.42)	1.35 (1.14 to 1.60)
Underweight	1.41 (0.82 to 2.39)	1.46 (0.84 to 2.54)	1.24 (0.70 to 2.21)
Women			
Obese	1.59 (1.21 to 2.08)	1.80 (1.35 to 2.39)	2.07 (1.49 to 2.89)
Overweight	1.34 (1.09 to 1.63)	1.36 (1.10 to 1.68)	1.55 (1.22 to 1.97)
Underweight	1.63 (0.93 to 2.84)	1.73 (0.97 to 3.08)	1.45 (0.79 to 2.67)
Men			
Obese	1.08 (0.74 to 1.58)	1.22 (0.83 to 1.79)	1.30 (0.84 to 1.87)
Overweight	1.01 (0.82 to 1.25)	1.07 (0.86 to 1.33)	1.16 (0.91 to 1.46)
Underweight	0.55 (0.07 to 3.92)	0.55 (0.08 to 3.96)	0.53 (0.07 to 3.82)

* Obese (>=30), overweight (25.0-29.9), normal (18.5-24.9), underweight (<18.5); reference group is those with normal body mass index.	
** Mid-life comorbidity includes hypertention, diabetes, and high cholesterol; late life comorbidity includes hypertension, stroke, diabetes, ischaemic heart disease, and hyperlipidaemia.	

Question 11:

How should we interpret the fully adjusted hazard ratio for overweight for all subjects:1.35 (1.14 to 1.60)?

1. Compared with being normal weight at mid-life, being overweight is associated with a statistically significant 35% increase in the rate of dementia after accounting for confounders.
2. Compared with being underweight at mid-life, being overweight is associated with a 35% increase in the rate of dementia after accounting for confounders.
3. Compared with being normal weight at mid-life, being overweight is associated with a non-significant 35% increase in the rate of dementia after accounting for confounders.
4. Compared with being normal weight at mid-life, being overweight is associated with a 135% increase in the rate of dementia after accounting for confounders.

Question 12:

How should we interpret the underweight results for women?

1. Being underweight in mid-life may increase the risk of dementia in women, but the findings are not statistically significant likely due to a small sample size in this group.
2. Since none of the hazard ratios for underweight are statistically significant, we can conclude that being underweight in mid-life does not increase a woman's risk of dementia.
3. Being underweight in mid-life significantly reduces the risk of dementia in women.
4. Being underweight in mid-life significantly increases the risk of dementia in women.

Question 13:

The relationship between obesity and dementia risk appears to be different for men and women, which might indicate interaction. Does the table contain sufficient proof of interaction?

1. Yes, the hazard ratios are significant for women but not for men.
2. Yes, the hazard ratios are higher for women than for men.
3. No, the table does not contain information about whether the effects in men are significantly different from those in women.

Question 14:

TRUE or FALSE. The elevated hazard ratios for obese and overweight for women are likely due to residual confounding.

3. True
4. False