※ 考生請注意：本試題 ☑可 □不可 使用計算機

1. Please explain the following terms: (5 pt each)
   a). Power or $1-\beta$
   b). Life-time risk
   c). Necessary cause
   d). Gene-environment interaction

2. What is the t-distribution? What is the t statistic for comparing the difference between independent means? (10 pt)

3. What are the assumptions in applying analysis of variance (ANOVA) comparing three or more means? (15 pt)

4. A study compares the risk of composite adverse outcomes in disease A and non-disease A patients in a population. Assuming the incidence densities are 12.8 and 3.6 per 10,000 person-year of observation in this population. Please identify a measurement that gives an indication of the greater risk of developing adverse outcomes in disease A patients. (5 pt) If the prevalence of disease A is 25 % in this population, what will be the magnitude of reduction in the numbers of adverse outcomes if disease A is eliminated? (5 pt)

5. In a case-control study, what are the disadvantages in choosing healthy individuals attending screening clinics as controls? (15 pt)

6. The following two 2x2 tables demonstrate the results of applying a particular test in high-risk population and general population.

   High-Risk population:

	Disease (+)	Disease (-)
Test (+)	344	18
Test (-)	24	116

   General population:

	Disease (+)	Disease (-)
Test (+)	258	248
Test (-)	18	1822

   a). Do the test properties change when applying to two different populations? Please show your calculations to answer the question. (6 pt)

   b). Is the test more useful in helping with diagnosis in high-risk population or general population? Please show your calculations to answer the question. (9 pt)

7. Please give an example of a case-control study (you can devise your own) and indicate how the observation bias can occur in this particular study design. (15 pt)