

1. Recapture rate of 487 marked scallops *Chlamys islandica*, during 5 successive tows along the same cruise track on St. Pierre Bank, south of the island of Newfoundland.

MC = Catch (kg/tow). NC = Number caught (scallops/tow). RC = Recaptures (scallops/tow).

Tow	MC	NC	Cumulative RC	RC
1	21.79	271	1	
2	20.22	260	20	
3	19.97	258	20	
4	20.27	256	28	
5	11.3	116	28	
Total	93.55	1161		

a. Calculate the number of recaptures on ***each*** of the last three tows. [3]

b. What proportion of marked scallops were recaptured over the last 3 tows? _____ [1]

c. A simple model of the relation of catch biomass (M = kg/tow) as a function of numbers caught (NC = scallops/tow) is:

$$NC = -56.8 + 15.4 MC$$

Write a data equation for the first tow.

$$\text{Tow 1} \quad \frac{\text{Data}}{\text{Data}} = \frac{\text{Model}}{\text{Model}} + \frac{\text{Residual}}{\text{Residual}} \quad [3]$$

What units does the parameter 0.0642 have ? _____ [1]

What units does the parameter 3.8 have ? _____ [1]

d. Complete the following table. [4]

e. State a null hypothesis concerning the first two and last two tows. [1]

Tows	NC		n
	mean	stdev	
1 + 2		7.778	
4 + 5		98.995	

f. Show how you calculated the numerator of the t-statistic to test the null hypothesis. [1]

Show how you calculated the denominator of the t-statistic to test the null hypothesis. [2]

g. Report your t-statistic $t =$ _____ [1]

circle the critical t-value to test your t-statistic at alpha = 5% [1]

df	1	2	3	4	1000
critical t-value for two-tailed test, alpha = 5%	12.71	4.30	3.18	2.78	1.96
critical t-value for one-tailed test, alpha = 5%	6.31	2.92	2.35	2.13	1.65

h. Do the two means differ significantly? [1]

2. Xu *et al* (2004 Chin Med J (Engl) 11:1611-9) exposed rats to cigarette smoke daily for 3.5 months, then measured lung capacity (Re = expiratory resistance, cm H_2O /l/second) via a face mask.

a. Using subscripts with the symbol RE , define a symbol for exposed and for control groups. _____ [1]

Using your symbolic notation, state a null (H_0) _____ [1]

and research (H_A) hypothesis _____ [1]

b. Is your test one-tailed or two tailed? _____ [1]

State reason for this choice _____ [1]

c. For each conclusion below by Xu *et al*, state in words the null hypothesis, circle the decision with respect to the null, and circle the type of error for that decision.

Number of alveoli unchanged H_0 : _____ [1]

Accept or Reject H_0 Type I or Type II _____ [2]

Reduction in dynamic compliance ($C(dyn)$) H_0 : _____ [1]

Accept or Reject H_0 Type I or Type II _____ [2]

3. In its 2014 report the Canadian Cancer Society's Advisory Committee on Cancer Statistics reported the age specific incidence rate (ASIR = number of new cases per 100,000 people per year) for melanoma (skin cancer) in Canada.

Year	Ages	Males	Females
1986	15-29	2.4	4.1
2010	15-29	1.8	3.8
1986	65 - 85+	59.7	38.4
2010	65 - 85+	140.9	70.6

b. Given the ASIR reported for women older than 65, calculate the expected **number** of new cases of melanoma in the province of Quebec, with 778,802 women in this age group in 2010. Report the expected number to the nearest whole number (integer). _____ [1]

c. The odds of developing melanoma are $(ASIR) / (100,000 - ASIR)$

Calculate

the odds of developing melanoma for women under 30 in 1986 _____ [1]

the odds of developing melanoma for women under 30 in 2010 _____ [1]

the Odds ratio for women under 30 in 2010 compared to 1986 OR = _____ [1]