Biology 4605/7220
5 October 2015

NAME Key

Exam 1b

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	0
4	20.27	256	28	8
5	11.3	116	28	0
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? 8/487 [1] = 0.0164

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.

Tow 1 $\underset{\text{Data}}{271} = \underset{\text{Model}}{278.77} + \underset{\text{Residual}}{-7.766}$ [3]

What units does the parameter ~~0.0642~~ 15.4 have ? scallop/kg [1]

What units does the parameter ~~3.8~~ -56.8 have ? scallop/tow [1]

d. Complete the following table. [4]

Tows	NC mean	NC stdev	NC n
1 + 2	265.5	7.778	2
4 + 5	186	98.995	2

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

H_0 $NC_{1+2} = NC_{3+4}$

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

186 - 265.5 or 265.5 - 186 = 79.5
= -79.5

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

$$\sqrt{\frac{7.778^2 + 98.995^2}{4-2}} = 70.216$$

g. Report your t-statistic t = 1.13 [1]

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

df	1	2	3	4	1000
citical t-value for two-tailed test, alpha = 5%	12.71	4.30	3.18	2.78	1.96
citical 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]

NO

one only for full mark

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. Re_{sm} Re_{CTL} [1]

Using your symbolic notation, state a null (H_o) 1/2 if one tailed $Re_{sm} = Re_{CTL}$ [1]

and research (H_A) hypothesis $Re_{sm} \neq Re_{CTL}$ [1]

b. Is your test one-tailed or two tailed? if both directions possible [1]

State reason for this choice [1]

0.5 for one tailed - must specify one tail if expect increase Re due to smoke

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_o: no change in Nalveoli [1]

Accept or Reject H_o Type I or Type II [2]

Reduction in dynamic compliance (C(dyn) H_o: no change in Cdyn [1]

Accept or Reject H_o 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).

(70.6/100,000)(778,802) = 550 cases [1]

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

Calculate

the odds of developing melanoma for women under 30 in 1986 2.4×10^{-5} [1] 4.1×10^{-5}

the odds of developing melanoma for women under 30 in 2010 1.8×10^{-5} [1] 3.8×10^{-5}

the Odds ratio for women under 30 in 2010 compared to 1986 OR = 1.33:1 [1] 0.927

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