Biology 4605/7220 NAME_____
5 October 2015 Exam 1a

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).

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

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

Tow	MC	NC	RC	Cumulative 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		

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

$$MC = 3.8 + 0.0642\ NC$$

Write a data equation for the first tow.

Tow 1 _____ = _____ + _____ [3]
Data = Model + Residual

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]

	MC		
Tows	mean	stdev	n
1 + 2		1.110	
4 + 5		6.343	

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
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]

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 (FEV = forced expiratory volume, ml/second) with a spirometer.

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

Using your symbolic notation, state a null (H_o) _____[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.

Decrease in dynamic compliance (C(dyn) H_o : _____[1]
Accept or Reject H_o Type I or Type II [2]

Number of alveoli unchanged H_o : _____[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 men older than 65, calculate the expected **number** of new cases of melanoma in the province of Quebec, with 627,117 men 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 1986 compared to 2010 OR = _____[1]