

Name: _____ Section: (day/time) _____

AMS5 - MIDTERM
Thursday, February 4th, 2010

A Normal Table is on the last page of this exam.

You must explain all answers and/or show working for full credit.

There are some **bonus questions**. You can get full marks on this exam without answering these questions. If you do give correct answers, you will get extra marks. You cannot score more than 100% on the exam, however.

You are reminded of the University's policy on Academic Misconduct.

1. (2 marks) A large, representative sample of Americans was studied by the Public Health Service. The percentage of respondents who were left-handed decreased steadily with age, from 10% at 20 years to 4% at 70. "The data show that many people change from left-handed to right-handed as they get older." True or false? Why? If false, how do you explain the pattern in the data?
2. (4 marks) A certain town has 25,000 families. These families own 1.6 cars, on average; the SD is 0.9. And 10% of the families have no cars at all. As part of an opinion survey, a simple random sample of 1,500 families is chosen. What is the chance that between 135 and 165 of the sample families will not own cars. Show your work.

[TURN OVER]

3. (9 marks) We recorded the heights of 64 of you during class. The table below gives, for each height (in inches), the number of times that height was recorded.

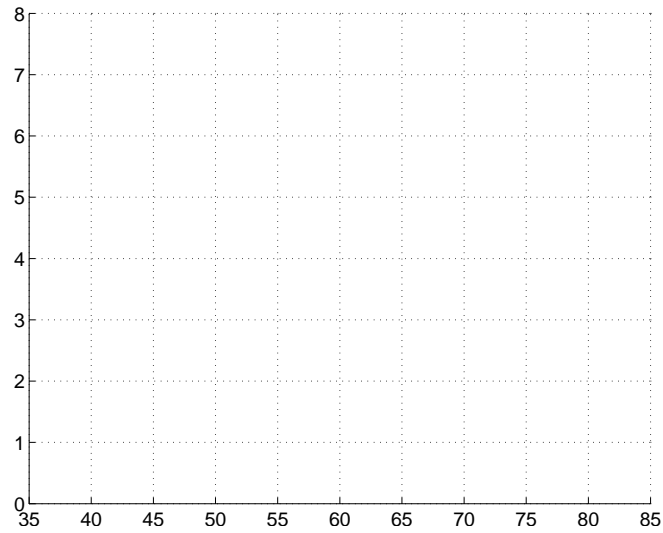
height	5	6	43	59	60	62	63	64	65	66	67
frequency	5	1	1	1	1	4	1	8	4	3	6
height	68	69	70	71	72	73	74	78	80	87	99
frequency	6	2	3	5	5	1	3	1	1	1	1

- (a) Which data values should be considered as errors? Why?
- (b) The median height for *all* the data is 67 inches. If the errors are excluded, what is the median height?
- (c) For the data excluding the errors, complete the table below, where the class interval includes the upper limit, but not the lower limit.

Class interval (inches)	frequency	percentage	width of class interval	percent-per-inch
40 - 50				
50-60				
60-65				
65-70				
70-80				

[CONTINUED]

(d) Sketch the histogram on the axes provided. Label the axes.



(e) Does the histogram follow the Normal curve? Explain briefly.

(f) Excluding the outliers, the mean height is 67.3 inches and the SD is 5.4 inches.
Using the Normal approximation, what proportion of students are 72 inches tall or taller?

(g) Excluding the outliers, what percentage of the students were actually 72 inches tall or taller?

(h) **[BONUS]** (2 marks) The data includes heights for both men and women. If we were to look at the data for the men and women separately, would the standard deviations for the men and women be larger, smaller or about the same as the 5.4 inches found for all the data. Explain.

[TURN OVER]

4. (5 marks) Read the abstract of the article “Cannabis Use and Sexual Health” printed at the end of this exam paper.

(a) Was this a controlled experiment or an observational study? Why?

(b) How were the subjects contacted? Give *one* potential problem with this method.

(c) The investigators report that “after adjusting for demographic factors, daily cannabis use compared with no use was associated with an increased likelihood of reporting two or more sexual partners in the previous year”.

Does using cannabis make you have more sexual partners? Explain.

(d) What does “after adjusting for demographic factors” mean?

(e) In the full article, the investigators state that the overall response rate was 56%. What effect might this response rate have on the results?

[CONTINUED]

5. (7 marks) The article discussed in the previous question performed a telephone survey. Especially with potentially embarrassing questions or illegal behaviors, subjects may be unwilling to tell the truth.
- (a) Would this bias the percentage of cannabis users reported in the study up or down? Explain briefly.

For a question with a yes/no response, one method to overcome this is as follows. You ask the subject to follow this procedure, in private, and tell you their answer at the end.

Toss a fair coin. If it comes up heads, answer honestly. If it comes up tails, toss the coin again, and answer “yes” if it comes up heads, and “no” if it comes up tails.

- (b) Explain why this procedure means that, even if someone responds “yes”, the investigators do not actually know whether the person does or does not use cannabis.

There are two different ways that result in someone answering “yes”.

- (i) The first coin toss is heads, and they use cannabis.
(ii) The first coin toss is tails, and the second coin toss is heads.

Are these events

- (c) independent? mutually exclusive? Explain briefly.

[TURN OVER]

Consider a population where an unknown proportion, p of the population use cannabis.

(d) What is the chance that a randomly selected person answers “yes” when asked if they use cannabis?

(e) 1000 people were asked, and 300 replied “yes”. What proportion of the population use cannabis?

(f) Using the proportion of the population you calculated in part 5e, if you were to chose 10 people randomly from the population, what’s the chance that 3 of them would be cannabis users?

(g) If the population proportion is 20%, in a sample of 1000 you would expect there to be _____ users, plus or minus _____.

[CONTINUED]

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Cannabis Use and Sexual Health

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ABSTRACT

Introduction. Cannabis is the most commonly used illicit substance worldwide. Despite this, its impact on sexual health is largely unknown.

Aim. The aim of this article is to examine the association between cannabis use and a range of sexual health outcomes.

Main Outcome Measures. The main outcome measures include the number of sexual partners in the past year, condom use at most recent vaginal or anal intercourse, diagnosis with a sexually transmissible infection in the previous year, and the occurrence of sexual problems.

Methods. Method used in this article includes a computer-assisted telephone survey of 8,656 Australians aged 16–64 years resident in Australian households with a fixed telephone line.

Results. Of the 8,650 who answered the questions about cannabis use, 754 (8.7%) reported cannabis use in the previous year with 126 (1.5%) reporting daily use, 126 reported (1.5%) weekly use, and 502 (5.8%) reported use less often than weekly. After adjusting for demographic factors, daily cannabis use compared with no use was associated with an increased likelihood of reporting two or more sexual partners in the previous year in both men (adjusted odds ratio 2.08, 95% confidence interval 1.11–3.89; $P = 0.02$) and women (2.58, 1.08–6.18; $P = 0.03$). Daily cannabis use was associated with reporting a diagnosis of a sexually transmissible infection in women but not men (7.19, 1.28–40.31; $P = 0.02$ and 1.45, 0.17–12.42; $P = 0.74$, respectively). Frequency of cannabis use was unrelated to sexual problems in women but daily use vs. no use was associated with increased reporting among men of an inability to reach orgasm (3.94, 1.71–9.07; $P < 0.01$), reaching orgasm too quickly (2.68, 1.41–5.08; $P < 0.01$), and too slowly (2.05, 1.02–4.12; $P = 0.04$).

Conclusions. Frequent cannabis use is associated with higher numbers of sexual partners for both men and women, and difficulties in men's ability to orgasm as desired. **Smith AMA, Ferris JA, Simpson JM, Shelley J, Pitts M, and Richters J. Cannabis use and sexual health. J Sex Med **,**,**–**.**

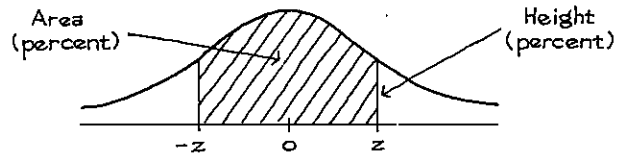
Key Words. Cannabis; Sexual Behavior; Sexual Health; Sexual Dysfunction

Introduction

Cannabis is the most widely cultivated and used illicit drug with an estimated 147 million people or 2.5% of the world population using it annually [1]. Its use has been linked to earlier and more frequent sexual activity, having multiple sexual partners, having casual sexual partners while traveling, inconsistent contraceptive use, and being diagnosed with a sexually transmissible infection [2–7].

Despite the prevalence of cannabis use and its apparent association with adverse sexual health outcomes, the link between cannabis use and sexual health has been the subject of remarkably few population-based studies. Those studies that have been done have focused on adolescents and young adults [8–15]. It is a criminal offence to possess, cultivate or sell cannabis in all states of Australia. However, possessors of small amounts of cannabis for personal use are generally issued an infringement fine rather than being prosecuted.

Tables



A NORMAL TABLE

<i>z</i>	<i>Height</i>	<i>Area</i>	<i>z</i>	<i>Height</i>	<i>Area</i>	<i>z</i>	<i>Height</i>	<i>Area</i>
0.00	39.89	0	1.50	12.95	86.64	3.00	0.443	99.730
0.05	39.84	3.99	1.55	12.00	87.89	3.05	0.381	99.771
0.10	39.69	7.97	1.60	11.09	89.04	3.10	0.327	99.806
0.15	39.45	11.92	1.65	10.23	90.11	3.15	0.279	99.837
0.20	39.10	15.85	1.70	9.40	91.09	3.20	0.238	99.863
0.25	38.67	19.74	1.75	8.63	91.99	3.25	0.203	99.885
0.30	38.14	23.58	1.80	7.90	92.81	3.30	0.172	99.903
0.35	37.52	27.37	1.85	7.21	93.57	3.35	0.146	99.919
0.40	36.83	31.08	1.90	6.56	94.26	3.40	0.123	99.933
0.45	36.05	34.73	1.95	5.96	94.88	3.45	0.104	99.944
0.50	35.21	38.29	2.00	5.40	95.45	3.50	0.087	99.953
0.55	34.29	41.77	2.05	4.88	95.96	3.55	0.073	99.961
0.60	33.32	45.15	2.10	4.40	96.43	3.60	0.061	99.968
0.65	32.30	48.43	2.15	3.96	96.84	3.65	0.051	99.974
0.70	31.23	51.61	2.20	3.55	97.22	3.70	0.042	99.978
0.75	30.11	54.67	2.25	3.17	97.56	3.75	0.035	99.982
0.80	28.97	57.63	2.30	2.83	97.86	3.80	0.029	99.986
0.85	27.80	60.47	2.35	2.52	98.12	3.85	0.024	99.988
0.90	26.61	63.19	2.40	2.24	98.36	3.90	0.020	99.990
0.95	25.41	65.79	2.45	1.98	98.57	3.95	0.016	99.992
1.00	24.20	68.27	2.50	1.75	98.76	4.00	0.013	99.9937
1.05	22.99	70.63	2.55	1.54	98.92	4.05	0.011	99.9949
1.10	21.79	72.87	2.60	1.36	99.07	4.10	0.009	99.9959
1.15	20.59	74.99	2.65	1.19	99.20	4.15	0.007	99.9967
1.20	19.42	76.99	2.70	1.04	99.31	4.20	0.006	99.9973
1.25	18.26	78.87	2.75	0.91	99.40	4.25	0.005	99.9979
1.30	17.14	80.64	2.80	0.79	99.49	4.30	0.004	99.9983
1.35	16.04	82.30	2.85	0.69	99.56	4.35	0.003	99.9986
1.40	14.97	83.85	2.90	0.60	99.63	4.40	0.002	99.9989
1.45	13.94	85.29	2.95	0.51	99.68	4.45	0.002	99.9991