# Homework for Day 6 Name: Minh Ta

#### Inferential statistics

1. Drinking water standards require that the level of chlorite in drinking water be less than 1.0 milligrams/liter. A test is performed to see if the drinking water of a town meets the standards. Let *c* be the amount of chlorite in the drinking water.

H0: c = 1.0, H1: c < 1.0

Null hypothesis: The level of chlorite in drinking water is 1.0 mg/l.

Alternative hypothesis: The level of chlorite in drinking water is less than 1.0 mg/l.

This is a one-tailed test.

2. If the heating and cooling system in a building is performing correctly, the temperature inside should be 21°C. The temperature of several rooms in the building is measured over several days, and the true average temperature *t* of the rooms in the building.

H0: t = 21, H1: t # 21

Null hypothesis: The temperature inside is 21°C.

Alternative hypothesis: The temperature inside is not 21°C

This is a two-tailed test.

3. John wants to see if his performance in a video game has improved. His baseline score is 2400. He plays the game a few more times and finds the average of his new scores. Let *s* (for score) be his new performance level.

H0: s = 2400, H1: s > 2400

Null hypothesis: John’s performance score is 2400.

Alternative hypothesis: John’s performance score more than 2400.

This is a one-tailed test.

4. A processing plant fills bottles of wine. If the processing plant is doing things right, each bottle gets 750 milliliters of wine. Several bottles of wine that the processing plant filled were opened and the amount of wine in each was carefully measured. Let *w* be the average of the amount of wine in all the bottles the plant fills.

H0: w = 750, H1: w # 750

Null hypothesis: The average amount of wine in each the bottle is 750.

Alternative hypothesis: The average amount of wine in each bottle is not 750.

This is a two-tailed test.

#### Probability Theory

1..5\*.7 = .35

2. .6\*.4=.24

3.

Says there are 100 intruders

|  |  |  |  |
| --- | --- | --- | --- |
|  | Clear | Not clear |  |
| Sunlight | 4.5 | .5 | 5 |
| Rain | 18.75 | 6.25 | 25 |
| Night | 42 | 28 | 70 |
| Total | 65.25 | 34.75 | 100 |

42 / 65.25 = .644

4. P(A) = 8 / 2^7 = 1 / 16

5.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Blue | Red |  |
| Stone | 10 | 30 | 40 |
| Glass | 14 | 42 | 56 |
|  | 24 | 72 | 96 |

a. 10

b. 7/16

c. 11/16

d. 3/4

6. Son has an urn filled with balls. The balls are either white, green, or red. The balls are either metal, glass, or plastic. There are 20 red glass balls in the urn.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | White | Green | Red |  |
| Metal | 5 | 5 | 10 | 20 |
| Glass | 80 | 0 | 20 | 100 |
| Plastic | 25 | 45 | 10 | 80 |
|  | 110 | 50 | 40 | 200 |

a. 10

b. 10

c. 20

d. 50

e. 200

f. 45

g. 100

h. 25

i. 80 / 200

j. 1/8

k. No

l. 1/4

m. 1/4

n. 9/26 (I used a calculator for all of those so they don’t include work)

7. Suppose the random variable *X* has the distribution function given in the table to the right.

|  |  |
| --- | --- |
| *x* |  |
| 0 | 0.1 |
| 3 | 0.3 |
| 4 | 0.1 |
| 7 | 0.5 |

a. Find = 3 \* .3 + 4 \* . 1 + 7 \* .5 = 4.8

b. Let . Find = 9.8

c. Let . Find . 4.8 \* 3 = 14.4

d. Find = 9 \* .3 + 16 \* .1 + 49 \* .5 = 28.8

8. Let *Y* and *W* be random variables with distribution functions as given in the tables to the right.

|  |  |
| --- | --- |
| *w* |  |
| -1 | 0.1 |
| 0 | 0.2 |
| 1 | 0.2 |
| 2 | 0.5 |

|  |  |
| --- | --- |
| *y* |  |
| -2 | 0.1 |
| -1 | 0.1 |
| 0 | 0.3 |
| 1 | 0.5 |

a. Find = -2 \* .1 – 1 \* .1 + 1 \* .5 = .2

b. Find = 1.1

Let .

c. What’s the range of *X*? = {-3, -2, -1, 0, 1, 2, 3}

d. Suppose that *Y* and *W* are independent. Fill out the table for distribution function for *X*.

|  |  |
| --- | --- |
| *x* |  |
| -3 | .01 |
| -2 | .03 |
| -1 | .07 |
| 0 | .18 |
| 1 | .21 |
| 2 | .25 |
| 3 | .25 |

e. Compute the expected value of *X* = 1.3

f. Verify that = 1.1 + .2 = 1.3