Sample of University of Michigan School of Information Masters of Applied Data Science Python and Statistics Assessments

Note that this is only a sample of possible questions that could be asked. Other topics will be covered, but this document is meant to give an idea for how skills and knowledge will be tested, and what kinds of topics may be touched on.

Sample of Python Assessments

1. Assume that you are creating a function that is working on a list of dictionaries. Each dictionary stores data about different interest groups. In each dictionary is a key called “questions_req” which has the value of True or False, depending on whether the group requires people to answer questions before they can join. Which of the following functions would create a list of groups that require someone to answer questions before they can join?

a.
```
def req_questions(data):
    requires = []
    for group in data:
        if group(“questions_req”) == True:
            requires.append(group)
    return requires
```

b.
```
def req_questions(data):
    requires = []
    for group in data:
        if group[“questions_req”]:
            requires.append(group)
    return requires
```

c.
```
def req_questions(data):
    return [group for group in data if group[“questions_req”] == False]
```

d.
```
def req_questions(data):
    requires = []
    for group in data:
        if group[“questions_req”] == True:
            requires += group
        return requires
```

2. Which of the following lines of code will sort the list of tuples called `circus` by the values stored in the fifth item in each tuple from highest to lowest? (Note that when we say fifth we mean what a human would consider fifth.)

a. sorted(circus, key = lambda d: d[4], reverse = False)
b. sorted(circus, key = lambda d: d[4], reverse = True)
c. sorted(circus, key = lambda c: circus[4], reverse = True)
d. sorted(circus, lambda z: z[4], True)

The following question will build off of the class definition below.

```
class Character():
    def __init__(self, name, height, alignment, level = 1, health = 50):
        self.name = name
        self.height = height
        self.alignment = alignment
        self.level = level
        self.health = health

    def init_skills(self, strength, dext, intel, wisdom, charm):
        self.strength = strength,
        self.dexterity = dext
        self.intelligence = intel
        self.wisdom = wisdom
        self.charm = charm

    def backstory(self, history):
        try:
            if self.backstory[-1] != " ":
                self.backstory = self.backstory + " " + history
            else:
                self.backstory += history
        except:
            self.backstory = history
```

3. Which of the following classes (called Magic) will properly inherit from the Character class while adding in the ability to keep a list of magic spells, where each spell is an object of the Magic class? Select as many as apply.

a.
```
class Magic(Character):

    def add_Spell(self, spell):
        try:
            self.spells.append(spell)
        except:
            self.spells = [spell]
```

b. class Magic():

```
def add_Spell(self, spell):
   try:
      self.spells.append(spell)
   except:
      self.spells = [spell]
```

c. class Magic(Character):

```
def __init__(self, spells):
  self.spells = spells

def add_Spell(self, spell):
      self.spells.append(spell)
```

d. class Magic(Character):

```
def __init__(self, name, height, alignment, level = 1, health = 50, spells = []):
   Character.__init__(self, name, height, alignment, level, health)
   self.spells = spells

def add_Spell(self, spell):
      self.spells.append(spell)
```

e. class Magic(Character):

```
def __init__(self, name, height, alignment, level = 1, health = 50, spells = []):
   Character.__init__(self, name, height, alignment, level = 1, health = 50)
   self.spells = spells

def add_Spell(self, spell):
      self.spells.append(spell)
```

Sample of Statistics Assessments

1. Say we have a random sample of n = 15 online customers from a large population of customers to a popular online auction site. With p = 0.07 of the population proportion making a purchase, what is the probability of selecting exactly two customers who actually make a purchase in the random sample? Please round up to the fourth decimal point.

_____

2. What type of bias would be introduced if a survey was conducted by phone asking people about how long they take to respond to emails and missed phone calls?

a. Selection b. Response c. Nonparticipation

For the next three questions, use the following information to determine your answers: A survey was sent out to compare the proportion of adults who use their car horns when driving for two age populations (1 = younger adults, defined as between 20 and 39 years old and 2 = older adults, defined as over 60 years old). The following data was obtained from those who responded.

	"Uses the horn?"		
Group	Yes	No	Total
1 = younger adults (between 20 and 39 years old)	261	240	501
2 = older adults (over 60 years old)	123	129	352

3. Calculate the 90% confidence interval using the standard normal distribution. Note that $\hat{p}_1$ = .52, $\hat{p}_2$ = .35, and $\hat{p}$ = 0.0338.

_____

4. This survey was done to test the suggestion that the proportion of younger adults who use their horn is greater than the proportion of older adults who use their horn. Which of the following represents the hypotheses that we will be testing, assuming that p_1 represents the population proportion of all young adults 20-39 who report using their horns and that p_2 represents the population proportion of all older adults 60+ who report using their horns?

a. H_0: $p_1 = p_2$ versus H_a: $p_1 > p_2$
b. H_0: $p_1 = p_2$ versus H_a: $p_1 < p_2$
c. H_0: $p_1 = p_2$ versus H_a: $p_2 > p_1$
d. H_0: $p_1 = p_2$ versus H_a: $p_2 \neq p_1$

5. Calculate the p-value and determine if we should accept or reject H_0 under alpha = 0.05.

p-value: _____

Please circle one: accept reject