Final Exam

Instructions

Please write your name and university-issued email address below in the space provided.

Name: _____

Email Address: _____

You will have 90 minutes to answer the questions contained herein. You may submit the exam at any time within that period. After submitting the exam, please leave the room until the end of the exam period. Once you begin the exam, you may not leave the room until you submit it. So if you need to use the restroom, please do so before opening the test booklet. Before opening the test booklet, please remove all items from your desktop, except drinks, snacks, and/or writing utensil(s). Also remove or reverse any forward-facing brimmed baseball hats. During the exam period, you are expected to not consult with any other source of information, and there should be no talking for any reason. If you have a question about the exam material, raise your hand and wait for an opportunity to ask the professor for clarification. Be advised: at various times during the exam period, as some students finish and leave the room, the professor may ask some of the remaining students to relocate desks, to achieve a more even space distribution. When you are ready, you may begin. Good luck!

Evaluation

The weight of each question is detailed below. Partial credit may be awarded, and there is no penalty for guessing. The professor may "curve" grades up to meet a desired minimum average score.

Question Number	Question Weight	Question Number	Question Weight
1	4%	9	9%
2	6%	10	4%
3	4%	11	10%
4	6%	12 (a, b, c, d)	12%
5	3%	12 (e, f)	10%
6	3%	13	6%
7	4%	14	4%
8	11%	15	4%

Application Software within a Business Context

1. What is an **information system**? Please define the term:

2. How can **businesses benefit from using computer-based information systems**? In other words, in what ways can **i**nformation systems provide value to a business? Please include benefits which can be measured in quantifiable terms.

3. What is the role, or purpose, of **software** within the context of a computer-based information system?

4. For businesses which produce customer-facing application software, why does their customers' **user experience** matter? In other words, how do businesses benefit from providing a good experience to their customers? Please include benefits which can be measured in quantifiable terms.

Python Programming

5. For any given Python variable named y, **write Python code** which will "print" that variable's datatype:

6. For any given Python variable named z, **write Python code** which will "print" all the methods and properties available to be invoked on it:

7. In Python, what does the `breakpoint()` keyword do? Why is it helpful? And in which situations would a developer benefit from using it?

8. For each of the following example Python objects, what is its **datatype**? There should be only one datatype per object. For nested objects, specify the datatype of the parent or outermost object.

   a. `{"title": "My Book", "color": "purple"}`   *Datatype*: _____

   b. `129.99`   *Datatype*: _____

   c. `2.0`   *Datatype*: _____

   d. `None`   *Datatype*: _____

   e. `{"letters": ["a", "e", "c", "b", "d"]}`   *Datatype*: _____

   f. `["a", "e", "c", "b", "d"]`   *Datatype*: _____

   g. `2335`   *Datatype*: _____

   h. `True`   *Datatype*: _____

   i. `"Hello from Outer Space :-D"`   *Datatype*: _____

   j. `{"numbers": [400, 800, 1200]}`   *Datatype*: _____

   k. `"$129.99"`   *Datatype*: _____

9. For each of the following example Python expressions, specify its **resulting value**. In other words, if you were to evaluate or "print" the expression, what would you see?

    a. `True and False`   *Result*: _____

    b. `True or False`   *Result*: _____

    c. `True == False`   *Result*: _____

    d. `True != False`   *Result*: _____

    e. `500 == 500`   *Result*: _____

    f. `500 == "500"`   *Result*: _____

    g. `500 > 500`   *Result*: _____

    h. `500 <= 500`   *Result*: _____

    i. `500 in [100, 500]`   *Result*: _____

10. Given a Python script located at filepath *"my-repo/app/services/my_service.py"* and an image file located at filepath *"my-repo/img/empire-state-building.png"*, **write Python code** which if written inside the script will reference the image's filepath in a reliable and operating-system agnostic way. Store the image's filepath in a variable called `img_filepath`. HINT: you might need to leverage the capabilities of a module.

11. Given the Python `salads` variable below, **write Python code** which references that variable to perform each of the following tasks:

```python
salads = [
    {"id": 1, "name": "Caesar", "price": 8.99},
    {"id": 2, "name": "Chicken Caesar", "price": 11.99},
    {"id": 3, "name": "Waldorf", "price": 10.99},
    {"id": 4, "name": "Cobb", "price": 9.99},
    {"id": 5, "name": "Caprese", "price": 9.99},
    {"id": 6, "name": "Nicoise", "price": 10.99},
]
```

a. Assuming the identifier, or `"id"` attribute, of each salad is and will always be unique, and assuming the order of salads may vary, "print" the name of the salad whose identifier is equal to 3 (i.e. `"Waldorf"`):

b. Assuming the `"price"` attribute represents a salad's cost to the consumer, "print" the number of salads which are more expensive than ten dollars (i.e. 3):

12. Given the Python variable called `trip` provided on the last page of the exam booklet, **write Python code** which references that variable to perform each of the following tasks:

a. "Print" a human-friendly message to denote the driver's first name (i.e. `"Your driver is Danny"`):

b. "Print" the number of stops this trip makes (i.e. `3`):

c. Assuming the stops will always be listed in ascending order of their stop sequence, "print" the name of the passenger who is traveling to the first stop (i.e. `"Vishal"`):

d. Loop through each of the trip's stops and "print" that stop's destination, one at a time (i.e. `"Madison Square"`, then `"Union Square"`, then `"Washington Square"`, each on its own line):

e. "Print" the total fare for this trip. The total fare is equal to the sum of all individual stop fares (i.e. `$17.98`). It is not necessary to round or adjust decimal places, but do include a dollar sign.

f. Define a custom function called `promotional_message` which accepts an input parameter called `driver` and "returns" (NOT "prints") a textual message about that given driver.

Valid `driver` parameter values are assumed to resemble the structure of the one found within the provided `trip` variable (i.e. has attributes indicating the driver's first name, last name, average rating, and number of total trips).

In the event the given driver's average rating is greater than `4.5`, then the message should include language about the driver's average rating (e.g. `"Your driver has an average rating of 4.8"`, where 4.8 refers to the given driver's average rating). Otherwise, the message should include language about the number of trips the given driver has completed (e.g. `"Your driver has completed 100 trips"`, where 100 refers to the given driver's total trips).

The function's invocation has been written for you below. Write the function's definition below such that it will be able to be invoked in the manner prescribed.

Definition:

Invocation:

```
print(promotional_message(trip["driver"]))
```

Fundamentals of Software Development

13. Please describe the advantages of writing **automated software tests** — for businesses or organizations which produce the software, for programmers who develop the software, and for consumers who use the software.

    a. *Advantage(s) for businesses / organizations*:

    b. *Advantage(s) for programmers*:

    c. *Advantage(s) for users*:

14. For businesses which produce application software, please describe the potential advantages and disadvantages of them **open-sourcing** the development of that software.

    a. *Advantage(s)*:

    b. *Disadvantage(s)*:

15. Why is it important to **exclude secret credentials** like passwords and API keys from an application's source code? And what techniques can developers use to do so?

This page has been left intentionally blank. Feel free to make notes on it. Its contents will not be evaluated.

```
trip = {
    "driver": {
        "first_name": "Danny",
        "last_name": "Dreyfus",
        "avg_rating": 3.6,
        "total_trips": 950
    },
    "vehicle": {
        "make": "Toyota",
        "model": "Prius",
        "year": 2015,
        "color": "cherry red"
    },
    "rideshare": True,
    "pickup_location": "Grand Central Terminal",
    "stops": [
        {
            "sequence": 1,
            "passenger": "Vishal",
            "destination": "Madison Square",
            "fare": 3.99
        },
        {
            "sequence": 2,
            "passenger": "Clara",
            "destination": "Union Square",
            "fare": 5.99
        },
        {
            "sequence": 3,
            "passenger": "Lee",
            "destination": "Washington Square",
            "fare": 7.99
        }
    ]
}
```