

# 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. Once you begin the exam, you may not leave the room until you submit it.

You are expected to not consult with any other source of information during the exam period. There should be no talking for any reason during the exam period. If you have a question about the exam material, raise your hand and wait for an opportunity to ask the professor for clarification.

Please do not unstaple the exam or re-order its pages in any way. When you are ready, you may begin. Good luck!

## Evaluation

The weights of all questions sum to 100%. The relative weight of each question is detailed in the tables below:

| Question Number | Question Weight |
|-----------------|-----------------|
| 1               | 5%              |
| 2               | 8%              |
| 3               | 6%              |
| 4               | 6%              |
| 5               | 2%              |
| 6               | 12%             |
| 7               | 3%              |
| 8               | 4%              |
| 9               | 10%             |

| Question Number | Question Weight |
|-----------------|-----------------|
| 10              | 9%              |
| 11              | 5%              |
| 12              | 6%              |
| 13              | 6%              |
| 14              | 5%              |
| 15              | 5%              |
| 16              | 4%              |
| 17              | 4%              |

# Fundamentals of Software Development

1. What is the role, or purpose, of **software** within the context of a computer-based information system?
2. What is the difference between **operating system (OS) software** and **application software**? Define each, and list three real-world commercial examples of each.
  - a. *Operating System Software:*
  - b. *Application Software:*
3. What is **software-as-a-service (SaaS)**? How (i.e. through what delivery mechanisms) are these services produced and consumed?
4. Please describe the advantages of writing automated software **tests** — for the business or organization which produces the software, for the programmer who develops the software, and for the consumer who uses the software.
  - a. *Advantage(s) for the business/organization:*
  - b. *Advantage(s) for the programmer:*
  - c. *Advantage(s) for the user:*

# Python Programming

5. What is **Python**?

6. For each of the **Python Datatypes** in the left column, draw a straight line to match it with its respective example in the right column:

- |               |  |
|---------------|--|
| a. List       | i. <code>2335</code>                                     |
| b. Float      | ii. <code>{"title": "My Book", "color": "purple"}</code> |
| c. Dictionary | iii. <code>False</code>                                  |
| d. Integer    | iv. <code>4.56</code>                                    |
| e. Boolean    | v. <code>"Hello World"</code>                            |
| f. String     | vi. <code>[100, 200, 300, 900, 1600]</code>              |

7. For any given Python variable named `x`, **write Python code** which will output that variable's datatype:

8. What specifically does the Python code `os.path.dirname(__file__)` refer to? And for what general purpose might you use a statement like this in a Python program?

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

```
delivery = {  
    "sender": "Charlie",  
    "recipient": "Anika",  
    "price": 16.99,  
    "status": "In Transit",  
    "stops": ["New York", "Denver", "San Francisco"]  
}
```

- a. Output a human-friendly message to denote the names of both the sender and receiver (i.e. "A delivery from Charlie to Anika"):
- b. Output the number of stops this delivery makes (i.e. 3):
- c. Assuming the number and order of stops may vary but there will always be at least one stop, output the name of the delivery's first stop (i.e. "New York"):
- d. Assuming the number and order of stops may vary but there will always be at least one stop, output the name of the delivery's last stop (i.e. "San Francisco"):
- e. Loop through each of the delivery's stops and output, or "print", that stop's name, one at a time (i.e. "New York", then "Denver", then "San Francisco", each on its own line):

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

```
books = [
    {"id":1, "title":"Book A", "color":"blue", "year":1901},
    {"id":2, "title":"Book B", "color":"red", "year":1957},
    {"id":3, "title":"Book C", "color":"blue", "year":1988},
    {"id":4, "title":"Book D", "color":"green", "year":1923},
    {"id":5, "title":"Book E", "color":"yellow", "year":2017}
]
```

- Assuming the identifier, or "id", of each book is and will always be unique, and assuming the order of books may vary, output the title of the book whose identifier is equal to 4 (i.e. "Book D"):
- Output the number of books which have a "color" attribute value equal to "blue" (i.e. 2):
- Assuming the "year" attribute represents the year a given book was published, output the number of books published after the year 1950 (i.e. 3):

11. Given the desired invocation of the Python `calculate_area()` function below, assuming its purpose is to produce a result representing the area of some rectangle, and assuming a rectangle's area is calculated by multiplying its length by its width, **write Python code** to define the `calculate_area()` function such that it will produce the desired result (i.e. 8):

```
# DESIRED INVOCATION:
area = calculate_area(length=4, width=2)

# DESIRED RESULT:
print(area) #> 8
```

12. Please list three built-in **Python modules** you “imported” over the course of the semester, and briefly explain the utility of, or the reason why you were using, each:

a.

b.

c.

13. Please list three third-party open source **Python packages** you “imported” or otherwise used over the course of the semester, and briefly explain the utility of, or the reason why you were using, each:

a.

b.

c.

# Software within a Business Context

14. How can a business or organization receive value through the usage, or **consumption**, of software products and services? Please provide three specific real-world commercial examples.
15. How can a business or organization receive value through the delivery, or **production**, of software products and services? Please provide three specific real-world commercial examples.
16. For a business or organization which **consumes** software products and services, what are the advantages and disadvantages of that software being **open source**?
17. For a business or organization which **produces** software products and services, what are the advantages and disadvantages of that software being **open source**?