Note: you do not need to fill out the following at this time, but you will need to do so when you see it again on the exam.

Full name: ____________________________________________________________

Student ID #: _________________________________________________________

I certify that I will keep my answers covered and do my best to not allow my exam paper to be viewed by another student during the exam or prior to completion of their exam. I also certify that I have not viewed or any way used another’s work in completing my answers. I understand that being caught allowing another to view my work or being caught viewing another’s work are both violations of this agreement and either will result in automatic failure of the course and an academic misconduct letter to the Deans Office for myself and any other individuals involved.

Signature: __________________________________________________________

I’ve included four examples of each of the following types of questions on the exam. Be sure to read through every question completely.

The questions on the exam are as follows:

1. Dual Choice — worth 2 points each.

2. Multiple Choice — worth 4 points each. Choose the best answer.

3. Fill-in-the-blank — each blank is worth 6 points. Be complete.

You may not use notes or books, your neighbors, or calculators or any other electronic devices on this exam. Turn off and put away your cell phone, pager, Inspector Gadget Watch, etc. now.
Part 1: A or B

1. A file that does **not** already exist may be used without error for _______________.  \( \text{(2)} \)
   - reading
   - writing

2. ________________ may contain elements of different types.  \( \text{(2)} \)
   - Arrays
   - Lists

3. If a program includes the line
   ```python
   from math import sqrt
   ________________ will assign 2.0 to x.
   ```
   - x = sqrt(4)
   - x = math.sqrt(4)

4. The expression ‘x’ * y is valid if and only if y is of type ________________.  \( \text{(2)} \)
   - int
   - str

Part 2: Multiple Choice

5. What sort of graph is displayed by the following complete program?  \( \text{(4)} \)
   ```python
   import numpy as np
   import matplotlib.pyplot as plt
   plt.plot(np.array([0,1,2]),np.array([1,2,3]))
   plt.show()
   plt.pie([50,25,25])
   ```
   - A line graph
   - A pie graph
   - A histogram
   - No output is displayed
6. Which of the following lines of code was used to create the following graph? Note: 

**matplotlib.pyplot** has been aliased to **plt** and **numpy** has been aliased to **np**.

- plt.hist(np.random.randint(5000),20)
- plt.hist(np.random.normal(5000))
- plt.hist(np.random.rand(5000),20)
- plt.hist(np.random.poisson(5000),100)

7. The following code is intended to compute the Euclidean distance between two points \((x_1, y_1)\) and \((x_2, y_2)\); i.e. \(\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}\). Which line contains a logical error?

```python
import numpy as np
a = np.array([x1,y1],float) # assume x1,y1 have been defined elsewhere
b = np.array([x2,y2],float) # assume x2,y2 have been defined elsewhere
c = a-b # LINE A
d = c**2 # LINE B
print np.sqrt(sum(d)) # LINE C
```

- There is no logical error.
- LINE A
- LINE B
- LINE C
8. On which line of this code fragment is the string output saved to the hard drive? (4)

<table>
<thead>
<tr>
<th>Line</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><code>f = open(filename,'w')</code> # LINE 1</td>
</tr>
<tr>
<td>2</td>
<td><code>output = &quot;It’s only a flesh wound.&quot;</code> # LINE 2</td>
</tr>
<tr>
<td>3</td>
<td><code>f.write(output)</code> # LINE 3</td>
</tr>
<tr>
<td>4</td>
<td><code>f.close()</code> # LINE 4</td>
</tr>
</tbody>
</table>

○ LINE 1
○ LINE 2
○ LINE 3
○ LINE 4

Fill-in-the-blank: Writing code

For each of the questions on this page, fill in the value, operator, or statement needed to produce the indicated output. Each line is worth 6 points.

9. `def question_9( x ):`

    """ x contains an input string for a literal dictionary, formatted as follows:

    "word:definition_1|definition_2|definition_3"

    Complete the function so that it returns the NUMBER of definitions associated with the word (in the example above, 3).

    """

    `f = x.split(":")`

    `g = _____________________________` (6)

    `return ____________ g _____` (6)
For the last question, you will write a complete function.

10. Write a function named question_10 which takes a filename as an argument and returns the number of lines in that file which begin with the letter a (lowercase), or the value None if the file does not exist.