

Part 2: Unit Testing Activity

For the unit testing activity, I have used the Snakestats unit test program.

Test set 1: Calculating the Variance in a series of numbers.

The goal of Test Set 1 is to evaluate a piece of Python code that performs statistical operations – calculating the variance in a string of numbers.

Here is the code needed to pass the 3 tests:

```
def getVariance(vals):  
    # Number of observations  
    n = len(vals)  
    # Mean of the data  
    mean = sum(vals) / n  
    # Square deviations  
    deviations = [(x - mean) ** 2 for x in vals]  
    # Variance  
    variance = sum(deviations) / n  
    return variance
```

Test 1:

Failing Test:

```
import unittest  
import snakestats  
  
class TestForSnakeStats(unittest.TestCase):  
  
    def test_getVariance(self):  
        theVariance = snakestats.getVariance([10,20,30])  
        self.assertEqual(theVariance, 66.66666666666667)  
  
unittest.main(argv=['ignored', '-v'], exit=False)  
  
test_getVariance (__main__.TestForSnakeStats) ... ERROR  
  
=====
```

ERROR: test_getVariance (__main__.TestForSnakeStats)

Traceback (most recent call last):
 File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_18528\1684211995.py", line 7, in test_getVariance
 theVariance = snakestats.getVariance([10,20,30])
AttributeError: module 'snakestats' has no attribute 'getVariance'

Ran 1 test in 0.005s

FAILED (errors=1)

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getVariance(self):
        theVariance = snakestats.getVariance([10,20,30])
        self.assertEqual(theVariance, 66.66666666666667)
```

```
unittest.main(argv=['ignored','-v'], exit=False)
```

```
test_getVariance (__main__.TestForSnakeStats) ... ok
```

```
-----
Ran 1 test in 0.005s
```

```
OK
```

Test 2:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getVariance(self):
        theVariance = snakestats.getVariance([234,353,457,589,789])
        self.assertEqual(theVariance, 36887.840000000004)
```

```
unittest.main(argv=['ignored','-v'], exit=False)
```

```
test_getVariance (__main__.TestForSnakeStats) ... ERROR
```

```
=====
ERROR: test_getVariance (__main__.TestForSnakeStats)
```

```
-----
Traceback (most recent call last):
```

```
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_1580\727684496.py", line 7, in test_getVariance
    theVariance = snakestats.getVariance([234,353,457,589,789])
AttributeError: module 'snakestats' has no attribute 'getVariance'
```

```
-----
Ran 1 test in 0.004s
```

```
FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getVariance(self):
        theVariance = snakestats.getVariance([234,353,457,589,789])
        self.assertEqual(theVariance, 36887.840000000004)

unittest.main(argv=['ignored','-v'], exit=False)

test_getVariance (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.001s

OK
```

Test 3:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getVariance(self):
        theVariance = snakestats.getVariance([2347,3457,5675,6579,7569,8767,9794])
        self.assertEqual(theVariance, 6297243.3877551025)

unittest.main(argv=['ignored','-v'], exit=False)

test_getVariance (__main__.TestForSnakeStats) ... ERROR

=====
ERROR: test_getVariance (__main__.TestForSnakeStats)
-----
Traceback (most recent call last):
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_1580\3460416410.py", line 7, in test_getVariance
    theVariance = snakestats.getVariance([2347,3457,5675,6579,7569,8767,9794])
AttributeError: module 'snakestats' has no attribute 'getVariance'

-----
Ran 1 test in 0.002s

FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getVariance(self):
        theVariance = snakestats.getVariance([2347,3457,5675,6579,7569,8767,9794])
        self.assertEqual(theVariance, 6297243.3877551025)

unittest.main(argv=['ignored','-v'], exit=False)

test_getVariance (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.001s

OK
```

Test set 2: Calculating the median in a series of numbers.

The goal of Test Set 2 is to evaluate a piece of Python code that performs statistical operation – calculating the median [the middle number] in a string of numbers.

Here is the code needed to pass the 3 tests:

```
def getMedian(vals):
    n = len(vals)
    index = n // 2
    # Sample with an odd number of observations
    if n % 2:
        return sorted(vals)[index]
    # Sample with an even number of observations
    return sum(sorted(vals)[index - 1:index + 1]) / 2
```

Test 4:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMedian(self):
        theMedian = snakestats.getMedian([10,20,30])
        self.assertEqual(theMedian, 20)

unittest.main(argv=['ignored','-v'], exit=False)

test_getMedian (__main__.TestForSnakeStats) ... ERROR

=====
ERROR: test_getMedian (__main__.TestForSnakeStats)
-----
Traceback (most recent call last):
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_4060\1359662608.py", line 7, in test_getMedian
    theMedian = snakestats.getMedian([10,20,30])
AttributeError: module 'snakestats' has no attribute 'getMedian'

-----
Ran 1 test in 0.004s

FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMedian(self):
        theMedian = snakestats.getMedian([10,20,30])
        self.assertEqual(theMedian, 20)

unittest.main(argv=['ignored','-v'], exit=False)

test_getMedian (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.003s

OK
```

Test 5:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMedian(self):
        theMedian = snakestats.getMedian([100,200,300,400,500])
        self.assertEqual(theMedian, 300)

unittest.main(argv=['ignored', '-v'], exit=False)

test_getMedian (__main__.TestForSnakeStats) ... ERROR

=====
ERROR: test_getMedian (__main__.TestForSnakeStats)
-----
Traceback (most recent call last):
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_4060\1854523765.py", line 7, in test_getMedian
    theMedian = snakestats.getMedian([100,200,300,400,500])
AttributeError: module 'snakestats' has no attribute 'getMedian'

-----
Ran 1 test in 0.002s

FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMedian(self):
        theMedian = snakestats.getMedian([100,200,300,400,500])
        self.assertEqual(theMedian, 300)

unittest.main(argv=['ignored', '-v'], exit=False)

test_getMedian (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.002s

OK
```

Test 6:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMedian(self):
        theMedian = snakestats.getMedian([1000,2000,3000,4000,5000,6000,7000])
        self.assertEqual(theMedian, 4000)

unittest.main(argv=['ignored', '-v'], exit=False)

test_getMedian (__main__.TestForSnakeStats) ... ERROR

=====
ERROR: test_getMedian (__main__.TestForSnakeStats)
-----
Traceback (most recent call last):
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_4060\4213445255.py", line 7, in test_getMedian
    theMedian = snakestats.getMedian([1000,2000,3000,4000,5000,6000,7000])
AttributeError: module 'snakestats' has no attribute 'getMedian'

-----
Ran 1 test in 0.002s

FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMedian(self):
        theMedian = snakestats.getMedian([1000,2000,3000,4000,5000,6000,7000])
        self.assertEqual(theMedian, 4000)

unittest.main(argv=['ignored', '-v'], exit=False)

test_getMedian (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.002s

OK
```

Test set 2: Calculating the mode in a series of numbers.

The goal of the last Test Set is to evaluate a piece of Python code that performs statistical operation – calculating the Mode [the number that occurred the greatest number of times] in a string of numbers.

Here is the code needed to pass the 3 tests:

```
def getMode(vals):
    frequency = {}

    for value in vals:
        frequency[value] = frequency.get(value, 0) + 1

    most_frequent = max(frequency.values())

    modes = [key for key, value in frequency.items()
              if value == most_frequent]

    return modes
```

Test 7:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMode(self):
        theMode = snakestats.getMode([10,20,20])
        self.assertEqual(theMode, [20])

unittest.main(argv=['ignored', '-v'], exit=False)

test_getMode (__main__.TestForSnakeStats) ... ERROR

=====
ERROR: test_getMode (__main__.TestForSnakeStats)
-----
Traceback (most recent call last):
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_24836\739469712.py", line 7, in test_getMode
    theMode = snakestats.getMode([10,20,20])
AttributeError: module 'snakestats' has no attribute 'getMode'

-----
Ran 1 test in 0.004s

FAILED (errors=1)
```


Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMode(self):
        theMode = snakestats.getMode([10,20,20])
        self.assertEqual(theMode, [20])

unittest.main(argv=['ignored','-v'], exit=False)

test_getMode (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.004s

OK
```

Test 8:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMode(self):
        theMode = snakestats.getMode([200,300,300,300,400])
        self.assertEqual(theMode, [300])

unittest.main(argv=['ignored','-v'], exit=False)

test_getMode (__main__.TestForSnakeStats) ... ERROR

=====
ERROR: test_getMode (__main__.TestForSnakeStats)
-----
Traceback (most recent call last):
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_24836\2275576583.py", line 7, in test_getMode
    theMode = snakestats.getMode([200,300,300,300,400])
AttributeError: module 'snakestats' has no attribute 'getMode'

-----
Ran 1 test in 0.001s

FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMode(self):
        theMode = snakestats.getMode([200,300,300,300,400])
        self.assertEqual(theMode, [300])
```

```
unittest.main(argv=['ignored','-v'], exit=False)
```

```
test_getMode (__main__.TestForSnakeStats) ... ok
```

```
-----
Ran 1 test in 0.002s
```

```
OK
```

Test 9:

Failing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMode(self):
        theMode = snakestats.getMode([1000,2000,3000,4000,4000,4000,4000])
        self.assertEqual(theMode, [4000])
```

```
unittest.main(argv=['ignored','-v'], exit=False)
```

```
test_getMode (__main__.TestForSnakeStats) ... ERROR
```

```
=====
ERROR: test_getMode (__main__.TestForSnakeStats)
```

```
-----
Traceback (most recent call last):
```

```
  File "C:\Users\Losheni\AppData\Local\Temp\ipykernel_24836\959003912.py", line 7, in test_getMode
    theMode = snakestats.getMode([1000,2000,3000,4000,4000,4000,4000])
AttributeError: module 'snakestats' has no attribute 'getMode'
```

```
-----
Ran 1 test in 0.001s
```

```
FAILED (errors=1)
```

Passing Test:

```
import unittest
import snakestats

class TestForSnakeStats(unittest.TestCase):

    def test_getMode(self):
        theMode = snakestats.getMode([1000,2000,3000,4000,4000,4000,4000])
        self.assertEqual(theMode, [4000])

unittest.main(argv=['ignored','-v'], exit=False)

test_getMode (__main__.TestForSnakeStats) ... ok

-----
Ran 1 test in 0.002s

OK
```