Computer Science 1	Lab 06A 1-Day Minor Java Assignment
Arithmetic with math Library Functions	**100 *through* 110 Point Versions**

Assignment Purpose:

The purpose of this program is to gain understanding of how to write complicated mathematical expressions using various functions & values from of the **math** library.

You will be given a series of mathematical expressions. You need to translate each expression into a Python program statement to compute its result, and then display it. This will be similar to what you did in Lab 4A with one big exception, this time you are using functions from the **math** library. You will notice that different problems are grouped by type. All *square root* problems use an **s** variable; all *absolute value* problems use an **a** variable; etc.

NOTE: Make sure you use **pi** for all calculations involving the value of π.

Lab 06A Student Version	Do not copy this file, which is provided.

```
# Lab06Ast.py
# "Arithmetic with math Library Functions"
# This is the student, starting version of Lab 06A.


from math import *

print()
print("************************************************")
print("Lab 06A, Arithmetic with math Library Functions")
print("100 Point Version")
print("By: JOHN SMITH") # Substitute your own name here.
print("************************************************")
print("\n")

q = 8.5
w = 10
x = 5
y = 77.77
z = 1.21

s1 = sqrt(25)
print("s1 = ",s1)

```

These are the mathematical expressions that you need to translate into Python:

Square Root Problems

$s_1 = \sqrt{25}$ $s_2 = \sqrt{100}$ $s_3 = \sqrt{3}$ $s_4 = \sqrt{x}$

$s_5 = \sqrt{y}$ $s_6 = \sqrt{x + y}$ $s_7 = \sqrt{e\pi}$

Absolute Value Problems

$a_1 = |\ 7\ |$ $a_2 = |\ -7\ |$ $a_3 = |\ -x\ |$

$a_4 = |\ y - z\ |$ $a_5 = |\ z - y\ |$ $a_6 = |\ e - \pi\ |$

Factorial Problems

$f_1 = 7!$ $f_2 = w!$ $f_3 = x!$ $f_4 = (wx)!$

Maximum/Minimum Problems

m_1 = The greater of **7** & **2**

m_2 = The greater of **w** & **x**

m_3 = The greater of π & e

m_4 = The lesser of **7** & **2**

m_5 = The lesser of **w** & **x**

m_6 = The lesser of π & e

Rounding Problems

$r_1 = 8.0001$ *rounded up*

$r_2 = 8.9999$ *rounded down*

$r_3 = y$ *rounded up*

$r_4 = z$ *rounded down*

$r_5 = q$ *rounded with banker's rounding*

$r_6 = \pi$ *rounded with banker's rounding*

$r_7 = e$ *rounded with banker's rounding*

Complicated Calculations

c_1 = $\sqrt{\sqrt{\sqrt{\sqrt{65536}}}}$

c_2 = $\sqrt{|e - \pi|}$

c_3 = The lesser of q^w and x^y

c_4 = The greater of e^π and π^e

c_5 = $\left[\frac{y}{x}\right]!$

c_6 = q
rounded to the nearest integer
(This is NOT the same as **r_5**!)

The formula for the area of a circle is

Area = πr^2

c_7 =
The area of a circle whose radius is **40***.*

c_8 =
The area of a circle whose radius is **w***.*

The formula for interest that compounds continuously is

Amount = Pe^{rt}

where **P** is the *Principal* (Deposit), **r** is the annual interest *rate* and **t** is the *time* measured in years.

c_9 = *The amount you would have if you put $25,000 in the bank and left it alone for 5 years at 10% interest.*

c_{10} = *The amount you would have if you put $400,000 in the bank and left it alone for 30 years at 7.5% interest.*

100 Point Output

The 100-point version requires that all calculations on page 2 are performed.
You are NOT required to perform the “Complicated Calculations” from page 3.

```
 ----jGRASP exec: python Lab06Av100.py

**************************************************
Lab 06A, Arithmetic with math Library Functions
100 Point Version
By: JOHN SMITH
**************************************************



s1 =  5.0
s2 =  10.0
s3 =  1.7320508075688772
s4 =  2.23606797749979
s5 =  8.818730067305609
s6 =  9.097801932335084
s7 =  2.922282365322278

a1 =  7
a2 =  7
a3 =  5
a4 =  76.56
a5 =  76.56
a6 =  0.423310825130748

f1 =  5040
f2 =  3628800
f3 =  120
f4 =  30414093201713378043612608166064768844377641568960
512000000000000

m1 =  7
m2 =  10
m3 =  3.141592653589793
```

```
m4 =  2
m5 =  5
m6 =  2.718281828459045

r1 =  9
r2 =  8
r3 =  78
r4 =  1
r5 =  8
r6 =  3
r7 =  3

 ----jGRASP: operation complete.
```

110 Point Output

The 110-point version requires that ALL calculations are performed. This means all of the calculations from page 2 AND all of the "Complicated Calculations" from page 3. Even if you do not figure out how to perform all of the "Complicated Calculations", you will still earn 1 bonus point for everyone that you do. For example, if you figure 3 of them out, you will earn a 103.

```
 ----jGRASP exec: python Lab06Av110.py

************************************************
Lab 06A, Arithmetic with math Library Functions
110 Point Version
By: JOHN SMITH
************************************************


s1 =  5.0
s2 =  10.0
s3 =  1.7320508075688772
s4 =  2.23606797749979
s5 =  8.818730067305609
s6 =  9.097801932335084
s7 =  2.922282365322278
```

```
a1 =  7
a2 =  7
a3 =  5
a4 =  76.56
a5 =  76.56
a6 =  0.423310825130748

f1 =  5040
f2 =  3628800
f3 =  120
f4 =  30414093201713378043612608166064768844377641568960
512000000000000

m1 =  7
m2 =  10
m3 =  3.141592653589793
m4 =  2
m5 =  5
m6 =  2.718281828459045

r1 =  9
r2 =  8
r3 =  78
r4 =  1
r5 =  8
r6 =  3
r7 =  3

c1 =  2.0
c2 =  0.6506234126825963
c3 =  1968744043.4072266
c4 =  23.140692632779263
c5 =  20922789888000
c6 =  9
c7 =  5026.548245743669
c8 =  314.1592653589793
c9 =  41218.031767503206
c10 =  3795094.3345434098

 ----jGRASP: operation complete.
```