SHRI RAMDEOBABA COLLEGE OF ENGINNERING AND MANAGEMENT, NAGPUR

NAME:TINA BORUNDIA

BATCH:C3

ROLL NO:65

Experiment:1

Aim:To Use Sage as a AdvancedCalculator

```
In [1]: 222+1
```
Out[1]: 223

```
In [2]: 25/5
```
Out[2]: 5

```
In [3]: 11*8
```
Out[3]: 88

```
In [4]: 999/11
```
Out[4]: 999/11

```
In [5]: 111-11
```
Out[5]: 100

```
In [6]: 999/11.n()
```
Out[6]: 90.8181818181818

```
In [7]: 999/11.0
```
Out[7]: 90.8181818181818

```
In [8]: cos(45)
```
Out[8]: cos(45)

In [10]: `cos(45).n()`

Out[10]: 0.525321988817730

In [11]: `sin(pi).n()`

Out[11]: 0.000000000000000

In [12]: `pi.n(digits=3)`

Out[12]: 3.14

In [17]: `pi/2.n(digits=6)`

Out[17]: 0.500000*pi

In [18]: `show(asin(1))`

$$\frac{1}{2}\pi$$

In [19]: `log(3)`

Out[19]: log(3)

In [20]: `ln(3.0)`

Out[20]: 1.09861228866811

In [21]: `log(3.0,2)`

Out[21]: 1.58496250072116

In [22]: `exp(1.0)`

Out[22]: 2.71828182845905

In [23]: `e^1.0`

Out[23]: 2.71828182845905

In [26]: `factorial(99.0)`

Out[26]: 9.33262154439442e155

In [27]:
```
a=1+4
a
```

Out[27]: 5

In [28]: `a=99^3`

In [29]:
```
a
```
Out[29]: 970299

In [31]:
```
a.digits()
```
Out[31]: [9, 9, 2, 0, 7, 9]

In [32]:
```
a.factor()
```
Out[32]: 3^6 * 11^3

In [35]:
```
a.is_prime()
```
Out[35]: False

In [36]:
```
gcd(2,4)
```
Out[36]: 2

In [37]:
```
lcm(13,11)
```
Out[37]: 143

In [38]:
```
list(primes(1,100))
```
Out[38]: [2,
           3,
           5,
           7,
           11,
           13,
           17,
           19,
           23,
           29,
           31,
           37,
           41,
           43,
           47,
           53,
           59,
           61,
           67,
           71,
           73,
           79,
           83,
           89,
           97]

defining a function

f(x)=sin(x^2)e^(-x)+3x+1

In [41]:
```
f=sin(x^2)*e^(-x)+3*x+1
show (f)
```

$$e^{(-x)} \sin\left(x^2\right) + 3\,x + 1$$

In [42]:
```
f(2.0)
```

Out[42]: 6.89757791994333

In [43]:
```
f(3).n()
```

Out[43]: 10.0205181712004

In [44]:
```
show(diff(f,x))
```

$$2\,x \cos\left(x^2\right) e^{(-x)} - e^{(-x)} \sin\left(x^2\right) + 3$$

In [53]:
```
def R(a,b,c) :
    x1=(-b+sqrt(b^2-4*a*c))/(2*a)
    x2=(-b-sqrt(b^2-4*a*c))/(2*a)
    return(x1,x2)
```

In [54]:
```
show(R(2,1,3))
```

$$\left(\frac{1}{4}\,\sqrt{-23} - \frac{1}{4}, -\frac{1}{4}\,\sqrt{-23} - \frac{1}{4} \right)$$

In [55]:
```
def A(b,h):
    s=(1/2)*b*h
    return(s)
```

In [56]:
```
show(A(2,3))
```

3

In [58]:
```
def H(a,b,c):
    s=(a+b+c)/2
    T=sqrt(s*(s-a)*(s-b)*(s-c))
    return(T)
show(H(1,2,3))
```

0

```
In [65]:  k=0
          for i in range (1,51) :
              k=k+i
          k
```

Out[65]: 1275

```
In [66]:  k=0
          for i in range (1,6) :
              k=k+i
          k
```

Out[66]: 15

```
In [67]:  def S(n):
              a=n*(n+1)/2
              return (a)
```

```
In [68]:  S(50)
```

Out[68]: 1275

```
In [69]:  show(S(51))
```

1326

Exercise Problem

1. Find the roots of x^3-2x^2-5x+6=0.

```
In [71]:  solve([x^3-2*x^2-5*x+6],x)
```

Out[71]: [x == 3, x == -2, x == 1]

2. Solve the system of non linear equations $x^2 + y^2 = 4$ and $y = x^2 - 2$ for x and y.

```
In [78]:  var('x,y')
          solve([x^2+y^2-4,x^2-y-2],x,y)
```

Out[78]: [[x == -sqrt(3), y == 1], [x == sqrt(3), y == 1], [x == 0, y == -2]]

3. Find the number digits in 1050! and how many zeros are there in 1050!

```
In [81]:  a=factorial(1050)
```

```
In [82]: show (a)
```

14101882007451414002529969256769928276094278838606811021 9656549883633675

◀ ▬   ▶

```
In [91]: a.ndigits()
```

Out[91]: 2719

```
In [92]: n=a.digits()
         n.count(0)
```

Out[92]: 472

4. Find the factors of sum of digits of 1275!.

```
In [1]: r=factorial(1275)
        sum(r.digits())
```

Out[1]: 13608

```
In [2]: factor(13608)
```

Out[2]: 2^3 * 3^5 * 7

5. Evaluate int {cos(x)}/{sqrt{sin(x)+1}}dx

```
In [95]: a=integral(((cos(x))/sqrt(sin(x)+1)),x)
         show(a)
```

$$2\sqrt{\sin(x)+1}$$

6. Find the fifth order derivative of $f(x) = ln(x) + 3x^3 + cos(2x)$

```
In [5]: f(x)=ln(x)+3*x^3+cos(2*x)
        f.diff(5)
```

Out[5]: x |--> 24/x^5 - 32*sin(2*x)

```
In [ ]:
```

7. Suppose an investment is made to a bank by an indivisual. The bank gives an annual interest at the rate 4%. Return is calculated by using compound interest. Create an user defined function to input the investment amount, the number of years for which investment is made,and print the returns.

```
In [3]:  a=int(input("enter the invested value:-"))
         r=4
         t=int(input("enter the duration:-"))
         i=a*(1+(r/100))^t
         i.n()
```

```
enter the invested value:-6000
enter the duration:-3
```

Out[3]: 6749.18400000000

What you Learn:

I learned to do basic calculations,integration,differentiation,and many other things using Sagemath.

```
In [ ]:
```