# ME010203 Numerical Analysis with Python3

## MCQ - Answers

1. Who developed Python Programming Language?

   **Answer: Guido van Rossum**

2. Which of the following is the correct extension of the Python file?

   **Answer: .py**

3. Which of the following is an invalid variable?

   **Answer: 1st_string**

4. Which of the following is used to define a block of code in Python language?

   **Answer: Indentation**

5. Which of the following character is used to give single-line comments in Python?

   **Answer: #**

6. What is the order of precedence in python?

   **Answer: Parentheses, Exponential, Multiplication, Division, Addition, Subtraction**

7. What are the values of the following Python expressions?

   2**(3**2)
   (2**3)**2
   2**(3*2)

   **Answer: 512, 64, 64**

8. What will be the output of the following code ?

   print(2**4 + (5 + 3)**(1 + 1))

   **Answer: 80**

9. Which of the following functions is a built-in function in python?

   **Answer: print()**

10. What arithmetic operator is used with strings in Python?

    **Answer: +**

11. Which of the following is a Python tuple?

    **Answer: (8, 9, 10)**

12. Let s = (0, 5, 8, 7), which of the following is incorrect?

    **Answer: s[1] = 4**

13. Which keyword is used for function?

    **Answer: Def**

14. What will be the value of x in the following Python expression?

    x = int(65.89+3/3)

    **Answer: 66**

15. What data type is use to store values in terms of key and value?

    **Answer: Dictionary**

16. What will be the output of the following Python code?

    a=100
    b=10
    b=a+b
    print(b)

    **Answer: 110**

17. What will be the output of the following Python code?

    myscore = 1000
    message = 'I scored %s points '
    print(message % myscore)

    **Answer: I scored 1000 points**

18. What will be the output of the following Python code?

    joketext = '%s: a device for finding furniture in the dark'
    bodypart1 = 'Knee'
    bodypart2 = 'Shin'
    print(joketext % bodypart2)

    **Answer: Shin: a device for finding furniture in the dark**

19. What will be the output of the following Python code?

    Vegetable_list = ['Tomato', 'Potato', 'Onion', 'Garlic', 'Beans', 'Ladies finger', 'Cucumber']
    print(Vegetable_list[2])

    **Answer: Onion**

20. What will be the output of the following Python code?

    Vegetable_list = ['Tomato', 'Potato', 'Onion', 'Garlic', 'Beans', 'Ladies finger', 'Cucumber']
    Vegetable_list[3] = 'Pumpkin'
    print(Vegetable_list)

    **Answer: ['Tomato', 'Potato', 'Onion', 'Pumpkin', 'Beans', 'Ladies finger', 'Cucumber']**

21. What will be the output of the following Python code?

    Vegetable_list = ['Tomato', 'Potato', 'Onion', 'Garlic', 'Beans', 'Ladies finger', 'Cucumber']

print(Vegetable_list[2 : 5])

**Answer: [‘Onion’, ‘Garlic’, ‘Beans’]**

22. What will be the output of the following Python code?

```
Vegetable_list = [‘Tomato’, ‘Potato’, ‘Onion’, ‘Garlic’, ‘Beans’, ‘Ladies finger’, ‘Cucumber’]
Vegetable_list.append(‘Banana’)
print(Vegetable_list)
```

**Answer: [‘Tomato’, ‘Potato’, ‘Onion’, ‘Garlic’, ‘Beans’, ‘Ladies finger’, ‘Cucumber’, ‘Banana’]**

23. What will be the output of the following Python code?

```
Vegetable_list = [‘Tomato’, ‘Potato’, ‘Onion’, ‘Garlic’, ‘Beans’, ‘Ladies finger’, ‘Cucumber’]
del Vegetable_list[5]
print(Vegetable_list)
```

**Answer: [‘Tomato’, ‘Potato’, ‘Onion’, ‘Garlic’, ‘Beans’, ‘Cucumber’]**

24. What will be the output of the following Python code?

```
age = 10
if age == 11:
print(‘Red’)
else:
print(‘Green’)
```

**Answer: IndentationError**

25. What will be the output of the following Python code?

```
age = 10
if age == 11:
    print(‘Red’)
else:
        print(‘Green’)
```

**Answer: Green**

26. What will be the output of the following Python code?

```
age = 10
if age < 10:
      print(‘Red’)
if age > 10:
      print(‘Green’)
else:
      print(‘Blue’)
```

**Answer: Blue**

27. What will be the output of the following Python code?

```
print(list(range(10, 20)))
```

**Answer: [10, 11, 12, 13, 14, 15, 16, 17, 18, 19]**

28. What will be the output of the following Python code?

```
x = 45
y = 80
while x <47 and y <83:
    x=x+1
    y=y+1
print(x, y)
```

**Answer: 47 82**

29. What are the parts of a Function in Python?

**Answer: Name, parameters & body**

30. What will be the output of the following Python code?

```
def savings(pocketmoney, earnedmoney, spending):
    return pocketmoney + earnedmoney - spending
print(savings(500, 800, 400))
```

**Answer: 900**

31. What will be the output of the following Python code?

```
def sillyagejoke(age):
    if age >= 10 and age <= 13:
        print('Green')
    else:
        print('Blue')
sillyagejoke(9)
```

**Answer: Blue**

32. What will be the output of the following Python code?

```
print(abs(-10))
```

**Answer: 10**

33. What will be the output of the following Python code?

```
print(int(123.456))
```

**Answer:123**

34. What will be the output of the following Python code?

```
print(len('this is a test string'))
```

**Answer: 21**

35. What will be the output of the following Python code?

```
Vegetable_list = ['Tomato', 'Potato', 'Onion', 'Garlic', 'Beans', 'Ladies finger', 'Cucumber']
```

```
del Vegetable_list[0]
print(len(Vegetable_list))
```

**Answer: 6**

36. What will be the output of the following Python code?

```
numbers = [5, 4, 8, 16, 12]
print(max(numbers))
```

**Answer: 16**

37. What will be the output of the following Python code?

```
for x in range(0, 3):
    print(x)
```

**Answer:**
**0**
**1**
**2**

38. What will be the output of the following Python code?

```
for x in range(10, 16, 2):
    print(x)
```

**Answer:**
**10**
**12**
**14**

39. What will be the output of the following Python code?

```
L = list(range(40, 30, -2))
print(L)
```

**Answer:** [**40, 38, 36, 34, 32**]

40. What is the output of the following?

```
15//4
```

**Answer: 3**

41. What is the output of the following?

```
2**10
```

**Answer: 1024**

42. What is the output of the following?

```
10%6
```

**Answer: None of these**

43. What will be the output of the following Python code?

```
z = complex(2, 3)
```

print(z.conjugate())

**Answer: 2-3j**

44. What will be the output of the following Python code?

```
z=4+3j
a=(z.real ** 2 + z.imag ** 2) ** 0.5
print(a)
```

**Answer: 5**

45. What will be the output of the following Python code?

```
z = complex(6, 8)
print(abs(z))
```

**Answer: 10**

46. Which of the following is the correct code to create three symbols x, y and z at a time?

**Answer:**
**from sympy import symbols**
**x,y,z = symbols('x,y,z')**

47. Which of the following is the correct code to factor the expression $x^2 - y^2$?

**Answer:**
**from sympy import factor, Symbol**
**x = Symbol('x')**
**y = Symbol('y')**
**expr = x**2 - y**2**
**factor(expr)**

48. Which of the following is the correct code to expand the expression $(x + y)(x - y)$?

**Answer:**
**from sympy import expand, Symbol**
**x = Symbol('x')**
**y = Symbol('y')**
**expr = (x+y)*(x-y)**
**expand(expr)**

49. What will be the output of the following Python code?

```
from sympy import pprint, symbols
x,y = symbols('x, y')
pprint(x**2+2*x*y+y**2)
```

**Answer:** $x^2 + 2xy + y^2$

50. What will be the output of the following Python code?

```
from sympy import symbols
x,y = symbols('x, y')
expr=x**2+2*x*y+y**2
```

print(expr.subs({x:1, y:2}))

**Answer: 9**

51. What will be the output of the following Python code?

```
from sympy import symbols, simplify
x,y = symbols('x, y')
expr=x**2+2*x*y+y**2
expr=expr.subs({x:1-y}))
print(simplify(expr))
```

**Answer: 1**

52. Which function is used to convert strings to Mathematical expressions?

**Answer: sympify**

53. What will be the output of the following Python code?

```
from sympy import Symbol, solve
x = Symbol('x')
expr = 2*x - 5 - 7
print(solve(expr))
```

**Answer:** [6]

54. What will be the output of the following Python code?

```
from sympy import Symbol, solve
x = Symbol('x')
expr = x**2+5*x+4
print(solve(expr))
```

**Answer:** $[-4, -1]$

55. What will be the output of the following Python code?

```
from sympy import Symbol, solve
x = Symbol('x')
expr = x**2+5*x+4
print(solve(expr, dict=True))
```

**Answer:** $[\{x : -4\}, \{x : -1\}]$

56. Which of the following is the correct code to solve the system of linear equations $2x + 3y = 6$ and $3x + 2y = 12$

**Answer:**

```
from sympy import symbols, solve
x, y = symbols('x, y')
expr1 = 2*x + 3*y - 6
expr2 = 3*x + 2*y-12
soln=solve((expr1, expr2), dict=True)
print(soln)
```

57. Which of the following is the correct code to plot the function $y = 2x + 3$?

    **Answer:**
    **from sympy.plotting import plot**
    **from sympy import Symbol**
    **x = Symbol('x')**
    **plot(2*x+3)**

58. Which of the following is the correct code to plot the functions $y = 2x + 3$ and $y = 3x + 1$?

    **Answer:**
    **from sympy.plotting import plot**
    **from sympy import Symbol**
    **x = Symbol('x')**
    **plot(2*x+3, 3*x+1)**

59. Which of the following is the correct code to plot the function $y = 7x - 5$ in the interval $[-5, 5]$?

    **Answer:**
    **from sympy.plotting import plot**
    **from sympy import Symbol**
    **x = Symbol('x')**
    **plot((7*x -5), (x, -5, 5))**

60. Which of the following is the correct code to plot the function $y = 7x - 5$ in the interval $[-5, 5]$ with title 'A line'?

    **Answer:**
    **from sympy.plotting import plot**
    **from sympy import Symbol**
    **x = Symbol('x')**
    **plot((7*x -5), (x, -5, 5), title='A line')**

61. Which of the following is the correct code to plot the function $y = 2x + 35$ and save the plot to a file line.png in the current directory?

    **Answer:**
    **from sympy.plotting import plot**
    **from sympy import Symbol**
    **x = Symbol('x')**
    **p=plot(2*x+3)**
    **p.save('line.png')**

62. What will be the output of the following Python code?

    from sympy import Symbol
    from sympy.plotting import plot
    x = Symbol('x')
    p = plot(2*x+3, 3*x+1, legend=True, show=False)
    p[0].line_color = 'b'
    p[1].line_color = 'r'

    **Answer: Nothing as output**

63. What will be the output of the following Python code?

```
from sympy import Symbol
from sympy.plotting import plot
x = Symbol('x')
p = plot(5*x+7, 9*x+1, legend=True, show=False)
p[0].line_color = 'b'
p[1].line_color = 'r'
p.show()
```

**Answer: Graph of the lines $y = 5x + 7$ in blue color and $y = 9x + 1$ in red color.**

64. What will be the output of the following Python code?

```
n=10
for x in range (1,n):
    if n%x==0:
        print(x)
```

**Answer:**
**1**
**2**
**5**

65. What will be the output of the following Python code?

```
import math
print(math.cos(math.pi/4))
```

**Answer:** $\frac{1}{\sqrt{2}}$

66. What will be the output of the following Python code?

```
import math
print(math.sin(math.pi/2))
```

**Answer: 1**

67. Which on is the correct program to find $\lim_{x\to 1}(x + 1)$?

**Answer:**

```
from sympy import Limit, Symbol
x = Symbol('x')
L=Limit(x+1, x, 1).doit()
print(L)
```

68. What will be the output of the following Python code?

```
from sympy import Limit, Symbol, S
x = Symbol('x')
L=Limit(1/x, x, S.Infinity).doit()
print(L)
```

**Answer: 0**

69. Which on is the correct program to find $\lim_{x\to 0^-} \frac{1}{x}$?

**Answer:**
**from sympy import Limit, Symbol**
**x = Symbol('x')**
**L=Limit(1/x, x, 0, dir='-').doit()**
**print(L)**

70. What will be the output of the following Python code?

```
from sympy import Limit, Symbol
x = Symbol('x')
L=Limit(1/x, x, 0, dir='+').doit()
print(L)
```

**Answer:** $\infty$

71. What will be the output of the following Python code?

```
from sympy import Limit, Symbol, S
n = Symbol('n')
L=Limit((1+1/n)**n, n, S.Infinity).doit()
print(L)
```

**Answer: e**

72. Which of the following is the correct code to find derivative of $x^3 + x^2 + x$?

**Answer:**
**from sympy import Derivative, Symbol**
**x = Symbol('x')**
**f = x**3 + x**2 + x**
**D=Derivative(f, x).doit()**
**print(D)**

73. What will be the output of the following Python code?

```
from sympy import Derivative, Symbol, pprint
x = Symbol('x')
f = x**2+x+1
D=Derivative(f, x).doit()
pprint(D)
```

**Answer: 2x+1**

74. What will be the output of the following Python code?

```
from sympy import Derivative, symbols, pprint
x,y = symbols('x,y')
f =y*x**2+y*x+y
D=Derivative(f,y).doit()
pprint(D)
```

**Answer:** $x^2 + x + 1$

75. Which of the following is the correct code to find partial derivative of $x^2y^3+2x^2y+xy$ with respect to y?

**Answer:**
**from sympy import Derivative, symbols, pprint**
**x,y = symbols('x,y')**
**f =x**2*y**3+2*x**2*y+x*y**
**D=Derivative(f,y).doit()**
**pprint(D)**

76. What will be the output of the following Python code?

```
from sympy import Symbol, Derivative, pprint
x = Symbol('x')
f = 5*x**5 + 2*x**3 + 8*x
d = Derivative(f, x, 2).doit()
pprint(d)
```

**Answer:** $100x^3 + 12x$

77. Which of the following is the correct code to find third order derivative of $12x^5 + 26x^3 + 19x + 10$?

**Answer:**
**from sympy import Derivative, Symbol**
**x = Symbol('x')**
**f = 12*x**5 +26* x**3 +19*x+10**
**D=Derivative(f, x, 3).doit()**

78. Which of the following is the correct code to find critical points of the function $f(x) = x^5 - 30x^3 + 50x$?

**Answer:**
**from sympy import Symbol, solve, Derivative**
**x = Symbol('x')**
**f = x**5 - 30*x**3 + 50*x**
**d1 = Derivative(f, x).doit()**
**criticalpoints = solve(d1)**
**print(criticalpoints)**

79. What will be the output of the following Python code?

```
from sympy import Symbol, solve, Derivative
x = Symbol('x')
f = x**2 -4*x
d1 = Derivative(f, x).doit()
print(solve(d1))
```

**Answer:** [2]

80. Which of the following is the correct code to find $\int x^3\,dx$? **Answer:**
**from sympy import Integral, Symbol**
**x = Symbol('x')**
**I=Integral(x**3, x).doit()**
**print(I)**

81. What will be the output of the following Python code?

from sympy import Integral, Symbol, pprint
x = Symbol('x')
I=Integral(2*x+3, x).doit()
pprint(I)

**Answer:** $x^2 + 3x$

82. What will be the output of the following Python code?

from sympy import Integral, Symbol
x = Symbol('x')
I=Integral(2*x+3, (x,0,2)).doit()
print(I)

**Answer: 10**

83. Which of the following is the correct code to find $\int_2^5 2x^3 + 5x + 10 \; dx$?

**Answer:**
**from sympy import Integral, Symbol**
**x = Symbol('x')**
**I=Integral(2*x**3+5*x+10, (x,2,5)).doit()**
**print(I)**

84. Which of the following is the correct code to find area between the curves $f(x) = x$ and $g(x) = x^2$ between the coordinates x=0 and x=1?

**Answer:**
**from sympy import Integral, Symbol**
**x = Symbol('x')**
**A=Integral(x-x**2, (x,0,1)).doit()**
**print(A)**

85. Which of the following is the correct code to find length of the curves $f(x) = x^2$ between the coordinates x=0 and x=5?

**Answer:**
**from sympy import Integral, Symbol, Derivative, sqrt**
**x = Symbol('x')**
**f=x**2**
**D=Derivative(f,x).doit()**
**L=Integral(sqrt(1+D**2), (x,0,5)).doit()**
**print(L)**

86. What will be the output of the following Python code?

from numpy import array
$a$ = array([[0, 0, 0], [0, 0, 0], [0, 0, 0]])
$a[1] = [2, 3, 2]$
print(a)

**Answer:**
[[0 0 0]

[2 3 2]
[0 0 0]]

87. What will be the output of the following Python code?

```
from numpy import array
a = array([[0, 0, 0], [0, 0, 0], [0, 0, 0]])
a[1, 1] = 5
print(a)
```

**Answer:**
[[0 0 0]
[0 5 0]
[0 0 0]]

88. What will be the output of the following Python code?

```
from numpy import array
a = array([[0, 0, 0], [0, 0, 0], [0, 0, 0]])
a[2, 0 : 2] = [8, −3]
print(a)
```

**Answer:**
[[0 0 0]
[0 0 0]
[8 − 3 0]]

89. What will be the output of the following Python code?

```
from numpy import array
a = array([[0, 0, 0, 0], [0, 0, 0, 0], [0, 0, 0, 0], [0, 0, 0, 0]])
a[1] = [1, 2, 3, 4]
a[2, 3] = 5
print(a)
```

**Answer: None of these**

90. What will be the output of the following Python code?

```
from numpy import array, dot
x = array([7, 3])
y = array([2, 1])
print dot(x,y)
```

**Answer:**
**17**

91. What will be the output of the following Python code?

```
from numpy import array, dot
x = array([7, 3])
A = array([[1, 2], [3, 2]])
print dot(A,x)
```

**Answer:** [13 27]

92. What will be the output of the following Python code?

```
from numpy import array, dot
A = array([[1, 2], [3, 2]])
B = array([[1, 1], [2, 2]])
print dot(A,B)
```

**Answer:**
[[5 5]
[7 7]]

93. What will be the Lagrange's Interpolation formula corresponding to the following discrete data ?

| | | | |
|---|---|---|---|
| **x** | $x_0$ | $x_1$ | $x_2$ |
| **y** | $y_0$ | $y_1$ | $y_2$ |

**Answer:**

$$y(x) = \frac{(x-x_1)(x-x_2)}{(x_0-x_1)(x_0-x_2)}y_0 + \frac{(x-x_0)(x-x_2)}{(x_1-x_0)(x_1-x_2)}y_1 + \frac{(x-x_0)(x-x_1)}{(x_2-x_0)(x_2-x_1)}y_2$$

94. What is $\nabla y_3$ in Newtons divided differences?

**Answer:** $\frac{y_3-y_0}{x_3-x_0}$

95. Which of the following is the Newton-Raphson formula?

**Answer:** $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

96. What will be the equivalent equations corresponding to the system of equations

4x+8y=10
16x+20y=7

**Answer:** **2x+4y=5**

**12y=33**

97. What will be the LU decomposition of the matrix $\begin{pmatrix} 2 & 1 \\ 8 & 7 \end{pmatrix}$?

**Answer:** $L = \begin{pmatrix} 1 & 0 \\ 4 & 1 \end{pmatrix} \quad U = \begin{pmatrix} 2 & 1 \\ 0 & 3 \end{pmatrix}$

98. Which of the following is the trapezoidal rule?

**Answer:** $\int_a^b f(x)dx = \frac{b-a}{2}[f(a) + f(b)]$

99. Which of the following is the composite trapezoidal rule?

**Answer:** $\int_{x_0}^{x_n} ydx = \frac{h}{2}[y_0 + 2(y_1 + y_2 + \cdots + y_{n-1}) + y_n]$

100. Which of the following is the Simpson's 1/3 Rule?

**Answer:** $\int_{x_0}^{x_2} f(x) = \frac{x_2 - x_0}{6} \left[ f(x_0) + 4f(x_1) + f(x_2) \right] dx$