

# TUGAS POLINOMIAL CHAPTER 15

Tugas Mata Kuliah SK5003 Pemrograman dalam Sains  
Numpy Python 3

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12 October 2021

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## TASK 1

### Soal

**15.1** Develop a Python program to evaluate polynomial function  $y = x^4 + 4x^2 + 7$ . Find an appropriate interval of  $x$  for which the function evaluation is done and plot the graph.

**15.4** Develop a Python program to solve the polynomial function  $y = x^4 + 4x^2 + 7$ .

### Jawab

Untuk menyelesaikan soal ini (menghitung nilai  $x$  dan  $y = f(x)$  lalu menggambar dan mencari akar), saya akan gunakan program *Python* berikut ini:

# SOAL 15.1

```
import numpy as np
from numpy.polynomial.polynomial import polyval
from numpy.polynomial.polynomial import polyroots
import matplotlib.pyplot as plt

# pecah data menjadi 30 selang
# initial condition
M = 30      # number of data points
xi = -5.0   # first value of x
xf = 5.0    # final value

# membuat x dan y = f(x)
x = np.linspace(xi, xf, M)

# koefisien polinomial
c = np.array([7,0,4,0,1])
print ("Coefficient list")
print (c)

# menghitung y = f(x)
y = polyval(x, c)

# print (x,y)
# kita bulatkan menjadi 4 angka di belakang koma
print ("Evaluating a polynomial")

# save ke dalam csv
# memberikan nama file
f = open("15_1.csv","w+")
```

```

for j in range(M):
    print (j, ". x = ", round(x[j],4), "; y = ", round(y[j],4))
    f.write(str(j)+", "+str(round(x[j],4))+", "+str(round(y[j],4)))

# save file
f.close()

# mencari akar
r = polyroots(c)
print("The roots: ")
print(r)

# menggambar dan menyimpan plot
plt.figure(figsize = (16,9))
plt.plot(x,y,'o-')
plt.xlabel('x')
plt.ylabel('y')
plt.savefig('15_1.png',dpi = 250)

```

Berikut adalah gambar grafiknya:

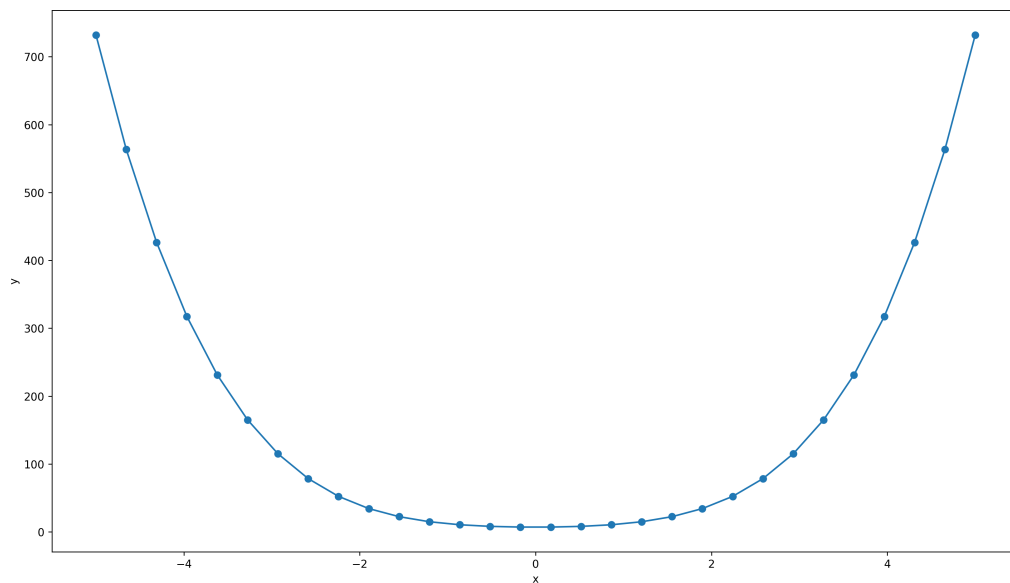


Figure 1: Gambar 15.1

Berikut adalah nilai  $x, y$  dari fungsi di atas:

```

## Warning in read.table(file = file, header = header, sep = sep, quote = quote, :
## incomplete final line found by readTableHeader on '15_1.csv'

```

```
## [1] X0          X.5.0          X732.01       X.4.6552      X563.29872   X.4.3103
## [7] X426.49823   X.3.9655      X317.18724   X.3.6207      X231.29385   X.3.2759
## [13] X165.08536   X.2.931       X115.16857   X.2.5862      X78.48948    X.2.2414
## [19] X52.33359    X.1.8966      X34.325410   X.1.5517      X22.429111   X.1.2069
## [25] X14.948112   X.0.8621      X10.524913   X.0.5172      X8.141714    X.0.1724
## [31] X7.119815    X0.1724       X7.119816    X0.5172      X8.141717    X0.8621
## [37] X10.524918   X1.2069       X14.948119   X1.5517      X22.429120   X1.8966
## [43] X34.325421   X2.2414       X52.333522   X2.5862      X78.489423   X2.931
## [49] X115.168524  X3.2759       X165.085325  X3.6207      X231.293826  X3.9655
## [55] X317.187227  X4.3103       X426.498228  X4.6552      X563.298729  X5.0
## [61] X732.0
## <0 rows> (or 0-length row.names)
```

Berikut adalah *roots* dari  $y = f(x) = 0$ .

The roots:

```
[-0.56822148-1.52409831j -0.56822148+1.52409831j  0.56822148-1.52409831j
 0.56822148+1.52409831j]
```

## TASK 2

### Soal

**15.2** Develop a Python program to evaluate the polynomial function  $y = 3x^5 + 6$ . Find an appropriate interval of  $x$  for which the function evaluation is done and plot the graph.

**15.5** Develop a Python program to solve the polynomial function  $y = 3x^5 + 6$ .

### Jawab

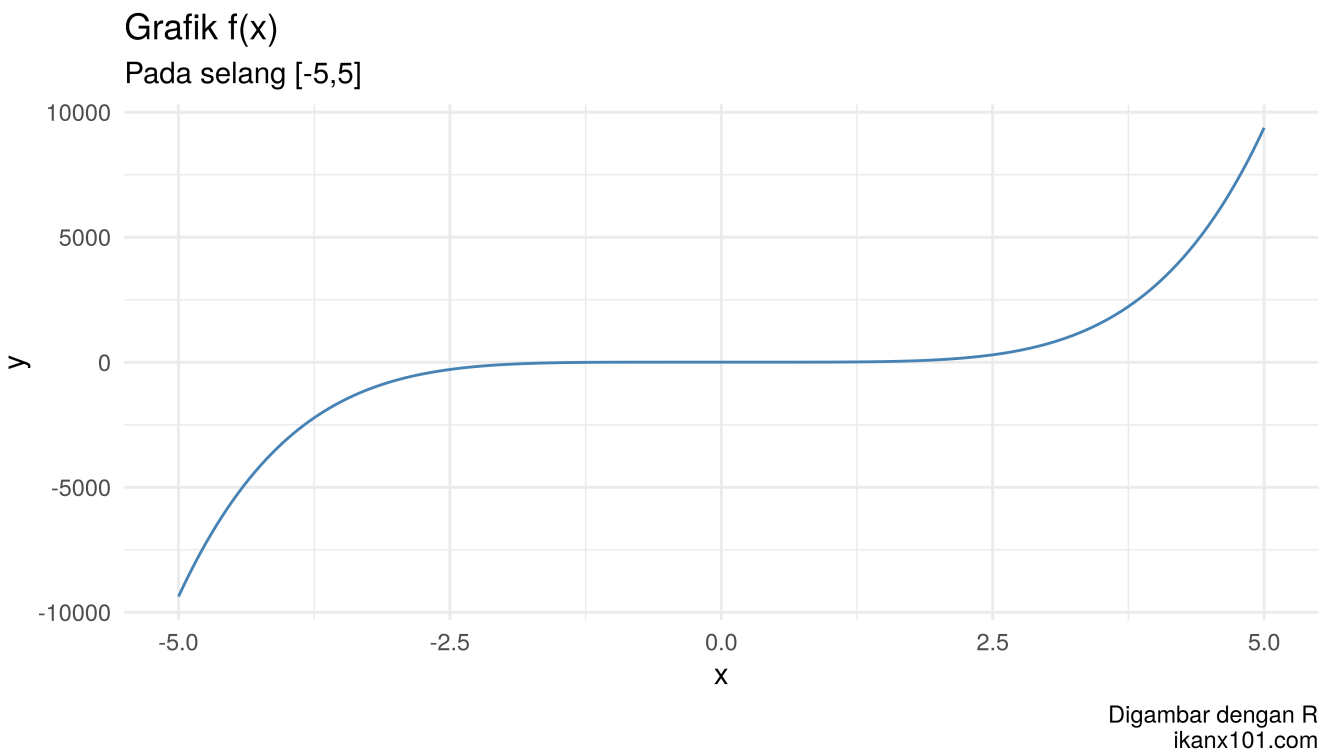


Figure 2: Gambar 15.2

## TASK 3

### Soal

**15.3** Develop a Python program to evaluate the polynomial function  $y = 2x^6 - 1.5x^5 + 5x^4 - 6.5x^3 + 6x^2 - 3x + 4.5$ . Find an appropriate interval of  $x$  for which the function evaluation is done and plot the relevant data.

**15.6** Develop a Python program to solve the polynomial function  $y = 2x^6 - 1.5x^5 + 5x^4 - 6.5x^3 + 6x^2 - 3x + 4.5$ .

### Jawab

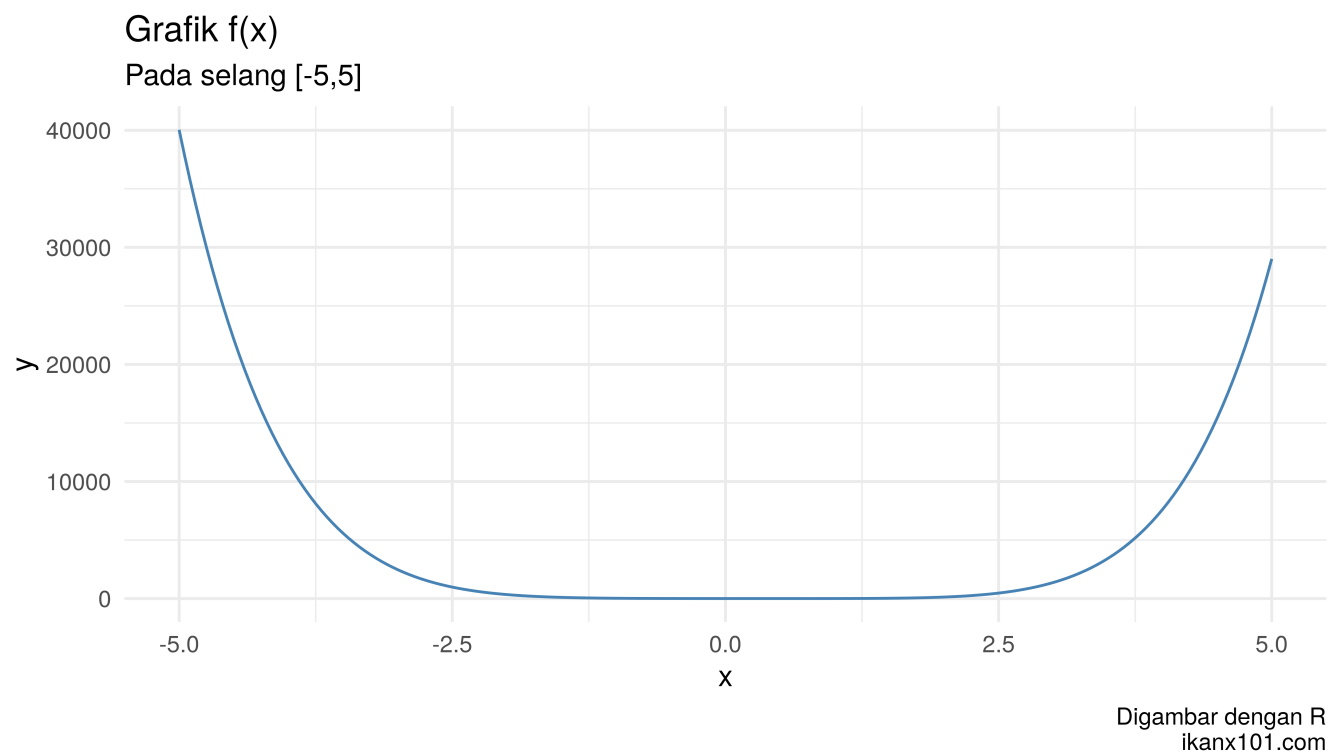


Figure 3: Gambar 15.3



**== End ==**