

BALITAAN, AXEL O.  
2022 - 05153

PART 1

```
$augcoefficientmatrix
      [,1] [,2] [,3] [,4] [,5]
[1,]    4   17   95  587   82
[2,]   17   95  587 3779  415
[3,]   95  587 3779 24827 2491
[4,]  587 3779 24827 165035 15973

$coefficients
[1] -12.150000  30.191667  -8.816667   0.775000

$polynomial_string
[1] "function(x) -12.1499999999985 + 30.1916666666647 * x ^ 1 +
-8.81666666666604 * x ^ 2 + 0.77499999999946 * x ^ 3"

$polynomial_function
function(x) -12.1499999999985 + 30.1916666666647 * x ^ 1 + -8.8
16666666666604 * x ^ 2 + 0.77499999999946 * x ^ 3
<environment: 0x00000277349a07a8>
```

*Figure 1.* Sample Run from Exercise.

```
$augcoefficientmatrix
      [,1] [,2] [,3] [,4]
[1,]    6   15   55 152.6
[2,]   15   55  225 585.6
[3,]   55  225  979 2488.8

$coefficients
[1] 2.478571 2.359286 1.860714

$polynomial_string
[1] "function(x) 2.47857142857141 + 2.35928571428574 * x ^ 1 + 1.860714285714
28 * x ^ 2"

$polynomial_function
function(x) 2.47857142857141 + 2.35928571428574 * x ^ 1 + 1.86071428571428 *
x ^ 2
<environment: 0x0000027735bb0908>
```

*Figure 2.* Sample Run from Lab Handout.

## PART 2

Degree	Answer	Graph
1	<pre>\$augcoefficientmatrix [1,1] [1,2] [1,3] [1,1] 10 295 224.05 [2,1] 295 9093 7352.67  \$coefficients [1] -33.739052 1.903188  \$polynomial_string [1] "function(x) -33.7390524967988 + 1.90318822023047 * x ^ 1"  \$polynomial_function function(x) -33.7390524967988 + 1.90318822023047 * x ^ 1 &lt;environment: 0x00000277361bee8&gt;</pre> $\text{function}(x) = -33.7390524967988 + 1.90318822023047 * x ^ 1$	<p><b>Amount Paid vs. ROI</b></p>
2	<pre>\$augcoefficientmatrix [1,1] [1,2] [1,3] [1,4] [1,1] 10 295 9093 224.05 [2,1] 295 9093 290995 7352.67 [3,1] 9093 290995 9609237 248793.93  \$coefficients [1] 58.9457390 -4.7681207 0.1145044  \$polynomial_string [1] "function(x) 58.9457390099187 + -4.76812072692561 * x ^ 1 + 0.114504368673031 * x ^ 2"  \$polynomial_function function(x) 58.9457390099187 + -4.76812072692561 * x ^ 1 + 0.114504368673031 * x ^ 2 &lt;environment: 0x0000027738b9c6f8&gt;</pre> $\text{function}(x) = 58.9457390099187 + -4.76812072692561 * x ^ 1 + 0.114504368673031 * x ^ 2$	<p><b>Amount Paid vs. ROI</b></p>
3	<pre>\$augcoefficientmatrix [1,1] [1,2] [1,3] [1,4] [1,5] [1,1] 10 295 9093 290995 224.05 [2,1] 295 9093 290995 9609237 7352.67 [3,1] 9093 290995 9609237 325693675 248793.93 [4,1] 290995 9609237 325693675 11281560333 8628651.93  \$coefficients [1] 36.0460961887 -2.3094931649 0.0295500927 0.0009491247  \$polynomial_string [1] "function(x) 36.0460961887288 + -2.3094931649286 * x ^ 1 + 0.0295500927169468 * x ^ 2 + 0.000949124654002479 * x ^ 3"  \$polynomial_function function(x) 36.0460961887288 + -2.3094931649286 * x ^ 1 + 0.0295500927169468 * x ^ 2 + 0.000949124654002479 * x ^ 3 &lt;environment: 0x00000277392d7358&gt;</pre> $\text{function}(x) = 36.0460961887288 + -2.3094931649286 * x ^ 1 + 0.0295500927169468 * x ^ 2 + 0.000949124654002479 * x ^ 3$	<p><b>Amount Paid vs. ROI</b></p>

4

```

$augcoefficientmatrix
      [,1]      [,2]      [,3]      [,4]
[1,]      10      295      9093      290995
[2,]      295      9093      290995      9609237
[3,]      9093      290995      9609237      325693675
[4,]      290995      9609237      325693675      11281560333
[5,]      9609237      325693675      11281560333      398000905555

      [,5]      [,6]
[1,] 9.609237e+06      224.05
[2,] 3.256937e+08      7352.67
[3,] 1.128156e+10      248793.93
[4,] 3.980090e+11      8628651.93
[5,] 1.426218e+13      305305993.17

$coefficients
[1] -7.608187e+02  1.104945e+02 -5.820918e+00  1.329415e-01
[5] -1.094709e-03

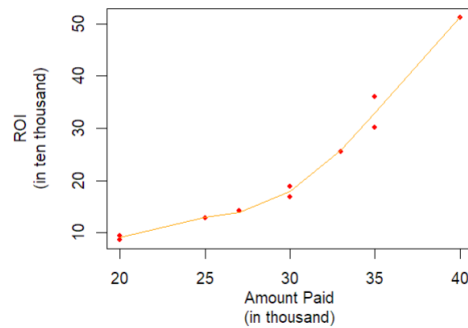
$polynomial_string
[1] "function(x) -760.818711502722 + 110.494450655524 * x ^ 1 +
+ -5.82091804334047 * x ^ 2 + 0.132941473295739 * x ^ 3 + -0.001094
0109470940116796 * x ^ 4"

$polynomial_function
function(x) -760.818711502722 + 110.494450655524 * x ^ 1 + -5.
82091804334047 * x ^ 2 + 0.132941473295739 * x ^ 3 + -0.001094
70940116796 * x ^ 4
<environment: 0x000027738f30da0>

```

function(x) =  
 -760.818711502722 +  
 110.494450655524 \* x ^ 1 +  
 -5.82091804334047 \* x ^ 2 +  
 0.132941473295739 \* x ^ 3 +  
 -0.00109470940116796 \* x ^ 4

Amount Paid vs. ROI



5

```

$augcoefficientmatrix
      [,1]      [,2]      [,3]      [,4]
[1,]      10      295      9093      290995
[2,]      295      9093      290995      9609237
[3,]      9093      290995      9609237      325693675
[4,]      290995      9609237      325693675      11281560333
[5,]      9609237      325693675      11281560333      398000905555
[6,]      325693675      11281560333      398000905555      1.490218e+13

      [,5]      [,6]      [,7]
[1,] 9.609237e+06      2.256937e+08      2.240000e+02
[2,] 3.256937e+08      1.128156e+10      7.352870e+03
[3,] 1.128156e+10      3.980090e+11      2.487939e+05
[4,] 3.980090e+11      1.426218e+13      8.628652e+06
[5,] 1.426218e+13      5.180371e+14      3.053060e+08
[6,] 5.180371e+14      3.907330e+16      1.098397e+10

$coefficients
[1] 1.153779e+03 -2.268201e+02  1.738530e+01 -6.673044e-01
[5] 1.239516e-02 -8.974915e-05

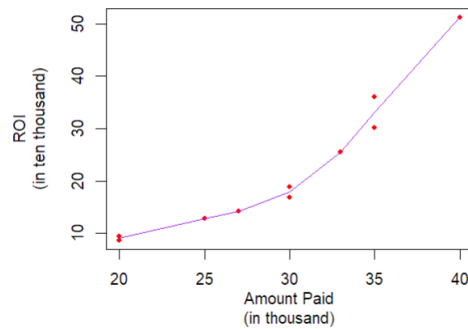
$polynomial_string
[1] "function(x) 1153.7793933229 + -226.82010617808 * x ^ 1 + 17.5852994446596 * x ^ 2 +
+ 0.667304408521712 * x ^ 3 + 0.0123951606904557 * x ^ 4 + -8.97491510416415e-05 * x ^ 5"

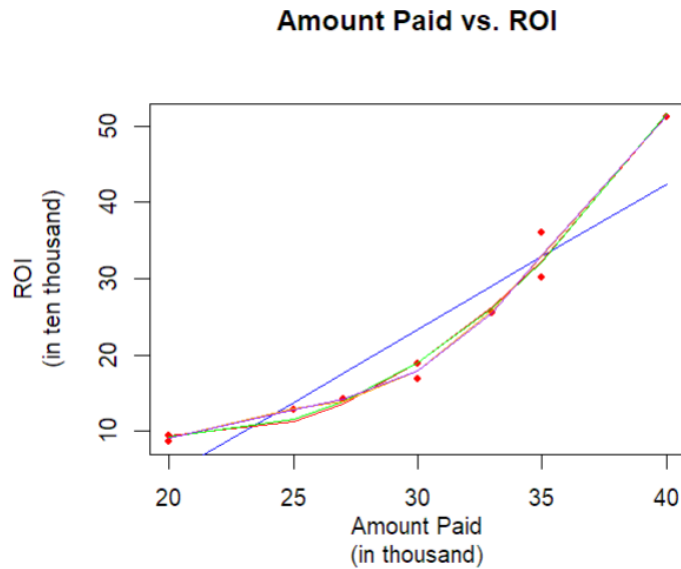
$polynomial_function
function(x) 1153.7793933229 + -226.82010617808 * x ^ 1 + 17.5852994446596 * x ^ 2 + -0.6673
04408521712 * x ^ 3 + 0.0123951606904557 * x ^ 4 + -8.97491510416415e-05 * x ^ 5
<environment: 0x000027732407718>

```

function(x) =  
 1153.7793933229 +  
 -226.82010617808 \* x ^ 1 +  
 17.5852994446596 \* x ^ 2 +  
 -0.667304408521712 \* x ^ 3 +  
 0.0123951606904557 \* x ^ 4 +  
 -8.97491510416415e-05 \* x ^ 5

Amount Paid vs. ROI





**Figure 3.** Consolidated graphs of degrees one to five.

The figure above shows how different polynomial regression models fit the data. The data points represent the relationship between the amount paid and the return on investment (ROI). The models range from degree one (linear) to degree five (quintic). The main findings are:

- There is a positive correlation between the amount paid and the ROI, meaning that paying more leads to higher returns. This is especially highlighted by the linear model (degree one), which has a positive slope.
- The regression exhibits curvature from the second to the fifth degree. This is because the variables have a higher degree, which leads to a polynomial regression function.
- Moreover, it is worth noting that the function has only slight variations in its curvature after the second degree.