Test 1

October 2, 2019

1. Cellphone Manufacturer

(a) Identify the varialbes and describe what each varibale represents.

c = cost to the company

d = price drop for each unit

t = tariff

x = total cost of manufacture/transport

r = Revenue

p = profit

(b) List all assumptions using functions/equations.

```
[121]: c(a) = 210 * a + 300000
       d(a) = 450 - (0.01+((a-1)/(100)))
       t(a)= 25*a
       x(a)= c(a)+ t(a)
       show(x(a))
```

```
[121]: 235*a + 300000
```

```
[122]: r(a) = d(a) * a
       p(a)= r(a) - x(a)
       show (p(a))
```

```
[122]: -1/100*(a - 45000)*a - 235*a - 300000
```

(c) How many units should be maufactured? In this case what would be the profit?

```
[131]: solve(diff(p(a))==0,a)
```
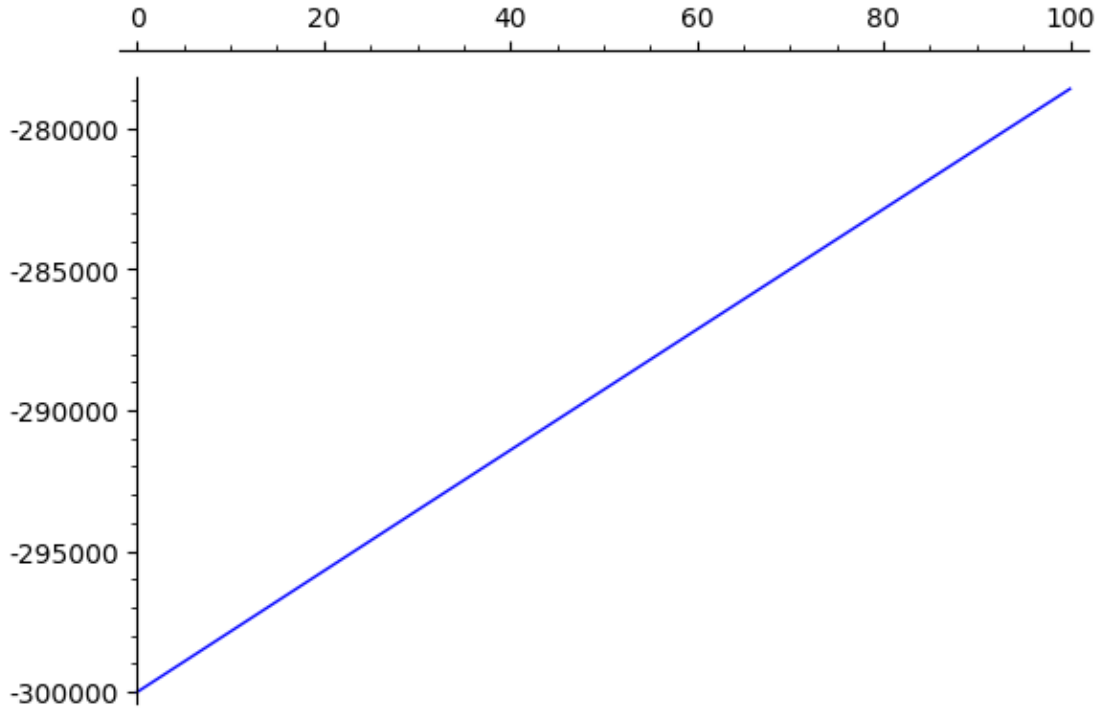
```
[131]: [a == 10750]
```

```
[132]: p(10750)
```

[132]: 855625

Answer: 10750 unit should be manufactured and $855625 Profit.
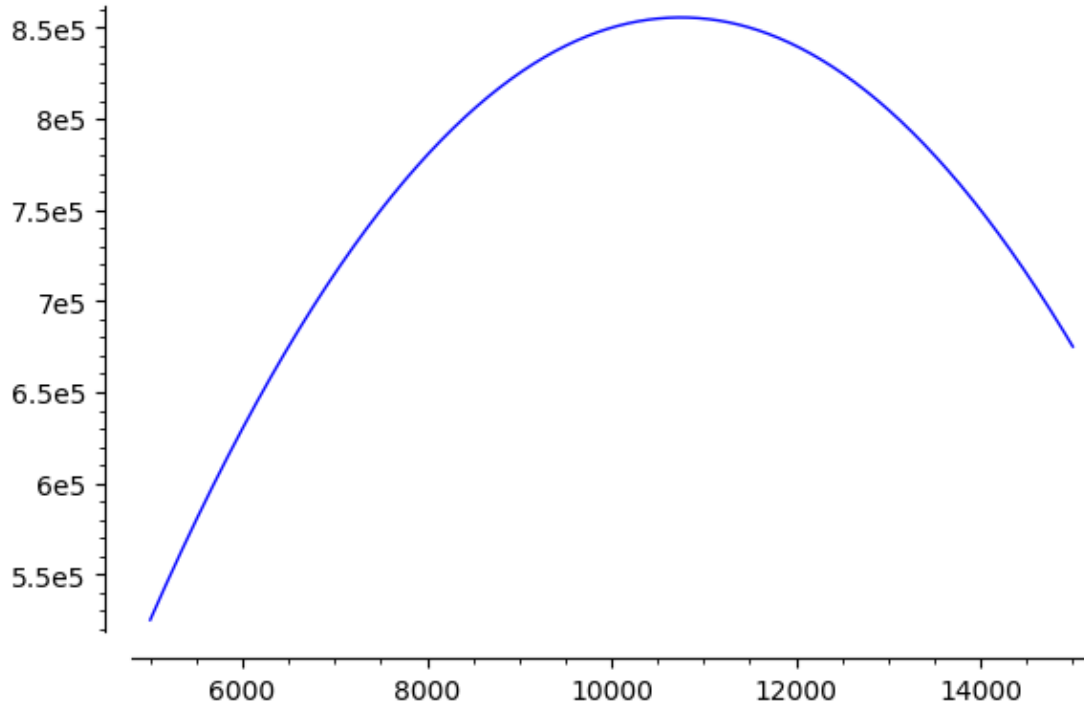
(d)

[133]: `plot(p(a),0,100)`

[133]:

Answer: Interval $[0,100]$ for a is not good because it is too small considering the unit sold is 10750. The best interval should be $[5000,15000]$ for a.

[137]: `plot(p(a),5000,15000)`

[137]:

(e) Explain what ould happen if we increace the asking price by 10%.

pi = price increase

```
[145]: pi = 450*.10
       d(a) = (450+pi) - (0.01+((a-1)/(100)))
       r(a) = d(a) * a
       p(a)= r(a) - x(a)
       show (p(a))
```

[145]: -1/100*(a - 49500.0000000000)*a - 235*a - 300000

```
[166]: solve(diff(p(a))==0,a)
```

[166]: [a == 9625]

```
[147]: p(13000)
```

[147]: 1.39000000000000e6

Answer: If the asking price increase by 10% then the more unit can be manufactor from 10750 to

(f) Explain what happen if we decrease the unit cost by 5%.

pd = price decrease

```
[156]: pd = 450*.05
       d(a) = (450-pd) - (0.01+((a-1)/(100)))
       r(a) = d(a) * a
       p(a)= r(a) - x(a)
       show (p(a))
```

[156]: -1/100*(a - 42750.0000000000)*a - 235*a - 300000

```
[157]: solve(diff(p(a))==0,a)
```

[157]: [a == 9625]

```
[158]: p(13000)
```

[158]: 512500.000000000

Answer: If the asking price decrease by 5% then the more unit can be manufactor from 10750 to 9625 and have smaller maximized profit from 855625 to 512500.

2. Electronics Store

(a) State the model for the profit as a function of the rebate.
    S = Sales in rebate
    P = Profit

```
[163]: S(x)=140*(1+0.14*(x/15))
       P(x)=(250-x)*S(x)
       show(P(x))
```

[163]: -(1.30666666666667*x + 140)*(x - 250)

(b) Determine the maximum Profit that can be obtained

```
[168]: solve(diff(P(a))==0,a)
```

[168]: [a == (500/7)]

```
[169]: P(500/7)
```

[169]: 41666.6666666667

Answer: the maximum profit can be obtain is $41666.67.

```
[0]:
```