math165_1_2_29.mw
Maple 10 Worksheet for Problems in Math 165 - Calculus for Business.

First load plots and student:

```
> with( student):with (plots):
```

Chapter 1 1.2 Problem 29 MANUFACTURING COST

1.2 Prob. 29: A manufacturer can produce CD players at a cost of \$40 apiece. It is estimated that if the CD players are sold for p dollars apiece, consumers will buy 120 - p of them a month. .

Express a manufacturer's monthly profit as a function of price, draw the graph, and estimate the optimal selling price.

Let
 p = selling price,
 q = units produced each month
 q = 120 - p, the demand as a function of price

The Revenue is (number of units)*(price) = q * p = (120-p)*p, and the Cost is 40*q = 40*(120 - p) dollars (dollars/month?).

The Profit is Revenue - Cost, so

```
> Revenue:= proc(p)
     description`Revenue at price p`;
     (120 - p) * p:
  end proc;
```

$$Revenue := \mathbf{proc}(p)\ \mathbf{description}\ `Revenue\ at\ price\ p`;\ (120-p)*p\ \mathbf{end\ proc} \tag{1}$$

```
> Cost:= proc(p)
     description`Cost at price p`;
     40 * (120 -p);
  end proc;
```

$$Cost := \mathbf{proc}(p)\ \mathbf{description}\ `Cost\ at\ price\ p`;\ 4800-40*p\ \mathbf{end\ proc} \tag{2}$$

```
> Profit:= proc(p)
      description`Profit at price p`;
      Revenue(p) - Cost(p):
  end proc;
```

$$Profit := \mathbf{proc}(p)\ \mathbf{description}\ `Profit\ at\ price\ p`;\ Revenue(p)-Cost(p)\ \mathbf{end\ proc} \tag{3}$$

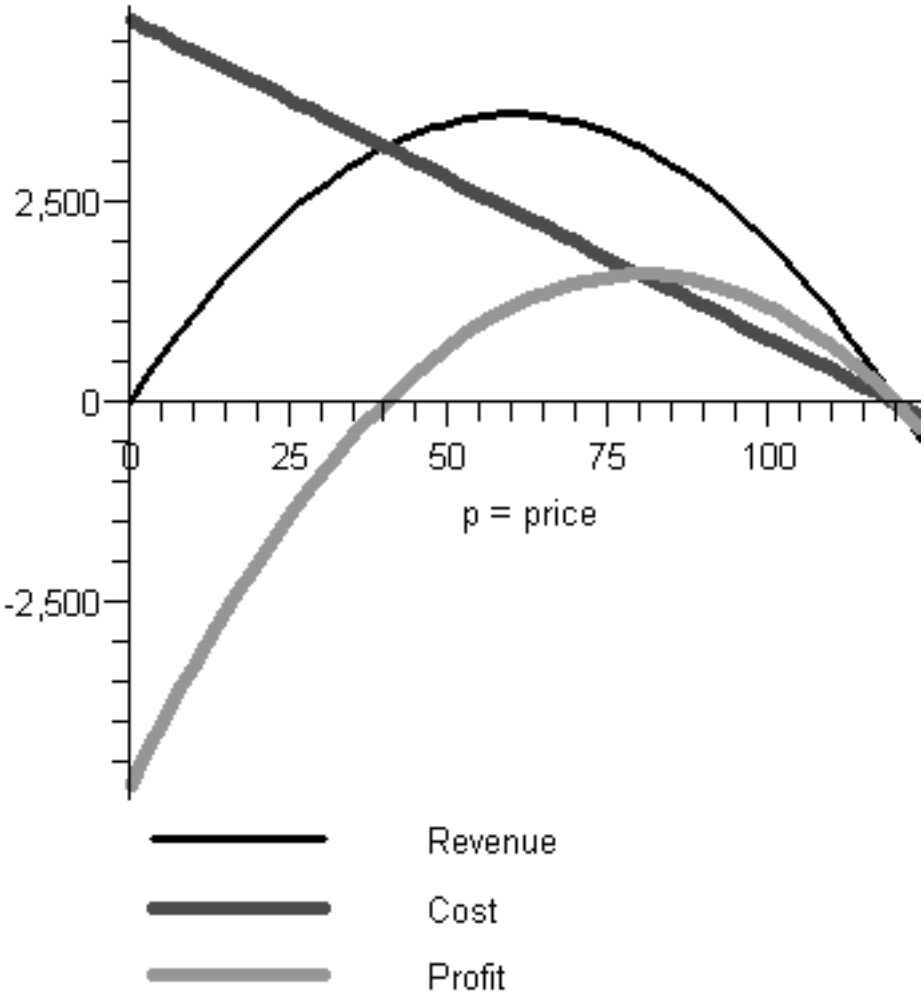
```
> simplify([Revenue(p),Cost(p),Profit(p)]);
```

$$\left[-(-120+p)\,p,\ 4800-40\,p,\ 160\,p-p^2-4800\right] \tag{4}$$

```
> factor(Profit(p));
```

$$-(p-40)\,(-120+p) \tag{5}$$

```
> plot([Revenue(p),Cost(p),Profit(p)],p = 0..125, color=[black,red,
  green], thickness = [2,3,4],labels = [`p = price`,``],legend=
  [Revenue,Cost,Profit]);
```




```
> maximize(Profit(p),p = 0..120,location);
```

$$1600, \{[\{p = 80\}, 1600]\} \tag{6}$$

The maximum profit occurs when the price is 80 dollars, 40 units are produced, and the profit is 1600 dollars.

$$? \tag{7}$$