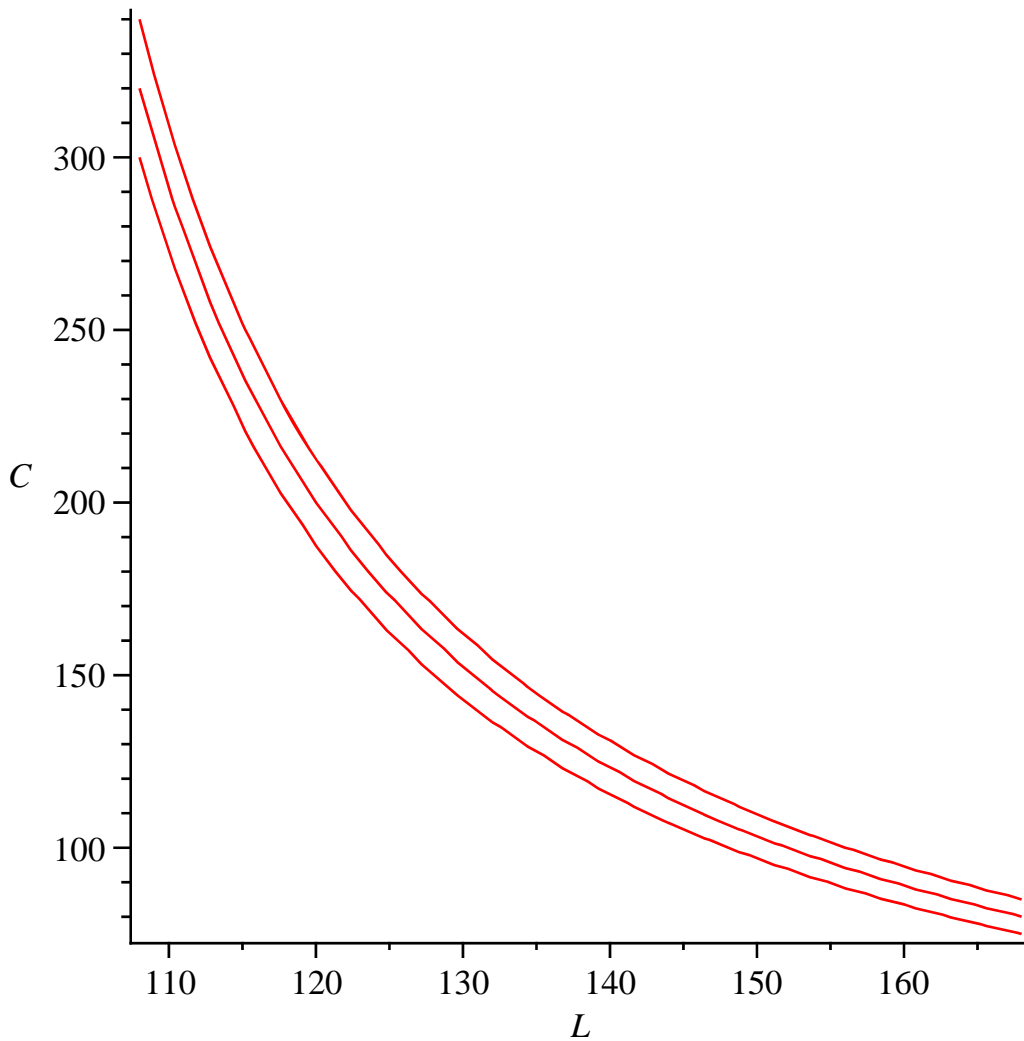


```
> u := unapply(L*C-88*C,L,C);
      u := (L, C) → LC - 88 C (1)
```

```
> plots[implicitplot]([u(L,C)=6800,u(L,C)=6400,u(L,C)=6000],L=108.
.168,C=0..900);
```



```
> MRS := unapply(D[1](u)(L,C)/D[2](u)(L,C),L,C);
      MRS := (L, C) → C / (L - 88) (2)
```

```
> 'u(98,680)' = u(98,680);
      u(98,680) = 6800 (3)
```

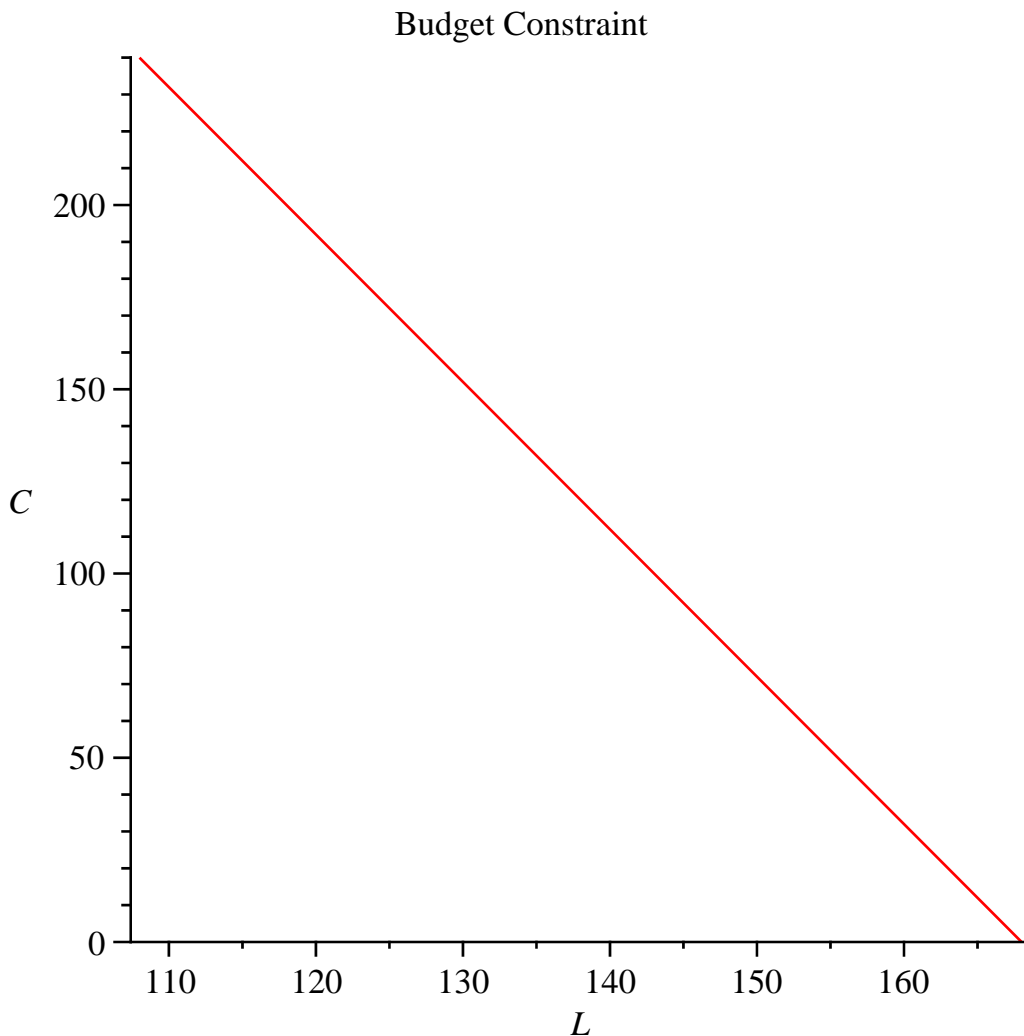
```
> 'MRS(L=98,C=680)' = MRS(98,680);
      MRS(L=98,C=680) = 68 (4)
```

```
> u(108,340);
      6800 (5)
```

```
> MRS(108,340);
      17 (6)
```

```
> Budget := C = w*(168-L);  
Budget := C = w (168 - L) (7)
```

```
> plots[implicitplot](subs(w=4,Budget),L=108..168,C=0..240,title=  
"Budget Constraint");
```



```
>  
> Budget4 := subs(w=4,Budget);  
Budget4 := C = 672 - 4 L (8)
```

```
> LL := [108, 118, 128];  
LL := [108, 118, 128] (9)
```

```
> 'MRS' (L=LL[1],C=subs(Budget4,L=LL[1],C)) = subs(Budget4,L=LL[1],  
MRS(L,C));
```

```
> 'MRS' (L=LL[2],C=subs(Budget4,L=LL[2],C)) = subs(Budget4,L=LL[2],  
MRS(L,C));
```

```
> 'MRS' (L=LL[3],C=subs(Budget4,L=LL[3],C)) = subs(Budget4,L=LL[3],  
MRS(L,C));
```

$$MRS(L = 108, C = 240) = 12$$

$$MRS(L=118, C=200) = \frac{20}{3}$$

$$MRS(L=128, C=160) = 4 \quad (10)$$

```
> with(Optimization);
  [ImportMPS, Interactive, LPSolve, LSSolve, Maximize, Minimize, NLPsolve, QPSolve] (11)
```

```
> Maximize(u(L,C), {Budget4});
  [6400.0000000000, [L=128., C=159.99999999999970]] (12)
```

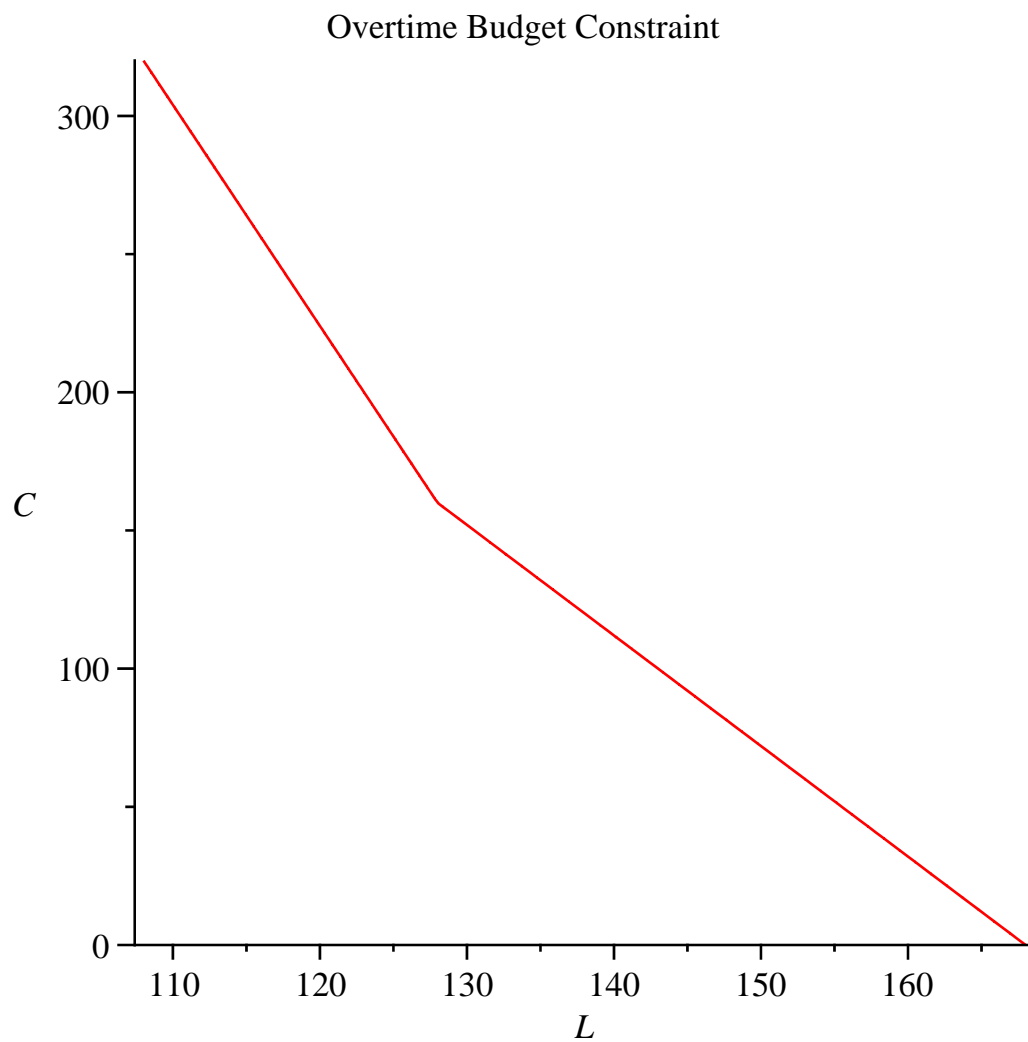
```
> solve({MRS(L,C)=4, Budget4}, {L,C});
  {L=128, C=160} (13)
```

```
> solve(subs(w=4, {MRS(L,C)=w, Budget}), {L,C});
  {L=128, C=160} (14)
```

```
> solve(subs(w=8, {MRS(L,C)=w, Budget}), {L,C});
  {L=128, C=320} (15)
```

```
> Budget_OT := C=piecewise(L<128, 4*(168-L)+4*(128-L), 4*(168-L));
  Budget_OT := C = \begin{cases} 1184 - 8L & L < 128 \\ 672 - 4L & otherwise \end{cases} (16)
```

```
> plots[implicitplot](Budget_OT, L=108..168, C=0..320, title=
  "Overtime Budget Constraint", numpoints=50000);
```



```
> solve(subs(w=8, {MRS(L,C)=w, Budget_OT}), {L,C});
      {L=118, C=240}
```

(17)

```
> plots[implicitplot]([u(L,C)=subs(%u(L,C)), Budget_OT], L=108.
    .168, C=0..900, numpoints=50000, color=[blue, red]);
```

