This is a Mathetica notbook to illustrate the computations for the welfare analysis of the gasoline demand problem set.
The long run form of the demand model is:

```
b={-7.733521, 2.798471, -2.53209,  -0.21095,   0.6953243}

q[p_,y_]:=Exp[b[[1]]+b[[2]] Log[y]+b[[3]]Log[p]+b[[4]]Log[p]^2+
                b[[5]]Log[p] Log[y]]
NDSolve[{y'[p]-q[p,y[p]]==0,y[1.3]==15},y,{p,1,5}]
```

Out[6]=

```
{-7.733521, 2.798471, -2.53209, -0.21095, 0.6953243}
```

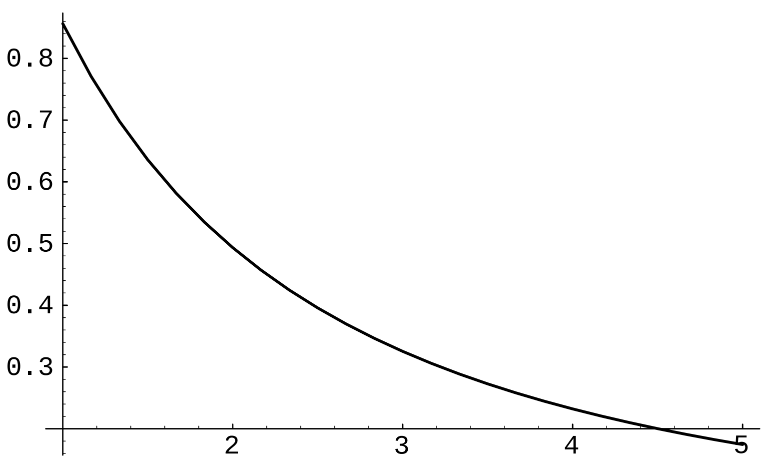
Out[8]=

```
{{y -> InterpolatingFunction[{1., 5.}, <>]}}
```

This is the Marshallian demand curve:

In[9]:=

```
Plot[q[p,15],{p,1,5}]
```

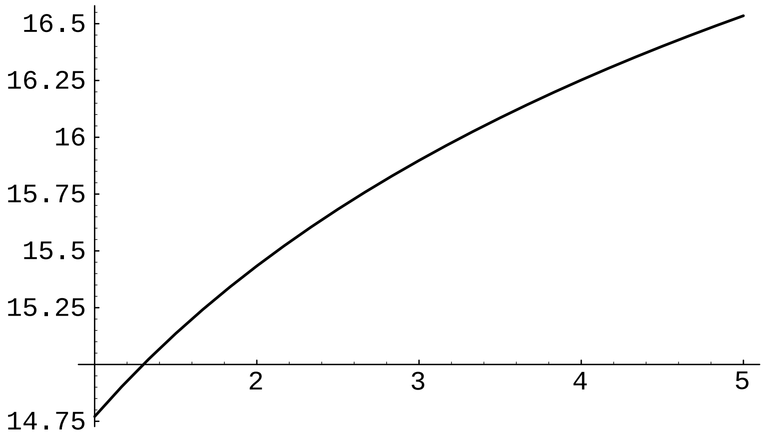


Out[9]=

```
-Graphics-
```

This is the Hicksian equivalent variation or expenditure function obtained by solving the differential equation above

```
Plot[Evaluate[y[p] /. %8],{p,1,5}]
```



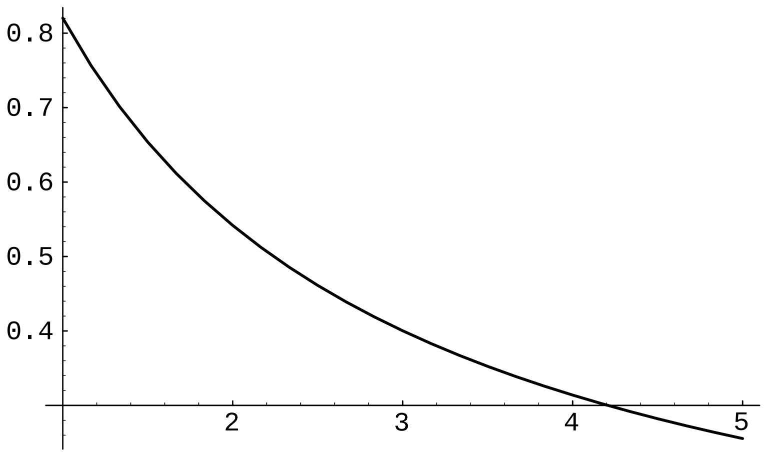
Out[10]=

-Graphics-

This is the Hicksian demand curve

In[11]:=

```
Plot[Evaluate[y'[p] /. %8],{p,1,5}]
```



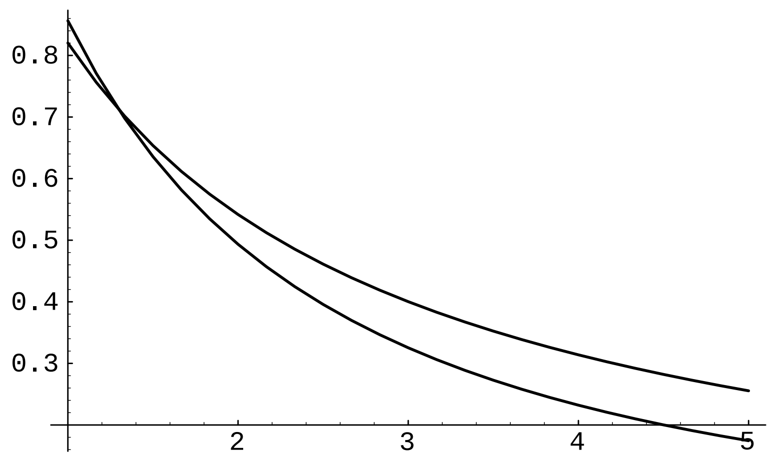
Out[11]=

-Graphics-

This is the Hicksian and Marshallian demand curves superimposed.

In[14]:=

```
Show[%11,%9]
```



Out[14]=

```
-Graphics-
```

Now we do several alternative estimates of dead weight loss.

1. Harberger triangle.

In[28]:=

```
N[1000(1.3-2.)(q[2,15.]-q[1.3,15.])/2]
```

Out[28]=

```
76.4379
```

2. Integral form of the Harberger triangle.

In[33]:=

```
1000(NIntegrate[q[p,15],{p,1.3,2.}]-(2.-1.3)q[2.,15.])
```

Out[33]=

```
69.0318
```

3. Integral form of Harberger triangle (using Hicksian demand curve).

```
1000(Evaluate[y[2.] /. %8]-Evaluate[y[1.3] /. %8]-(2.-1.3)
                      Evaluate[y'[2.] /. %8])
```

Out[32]=

```
{54.36}
```

Note that all of these computations are done for the "representative consumer" withaverage income -- an interesting extension would be to recompute everything by integrating over the relevant income distribution.