Practical - 7

Plotting the characteristics for the first order PDE

Find the Characteristic Equation of the Curve (u-y)*ux + y* uy = x+y

dx/(u-y) = dy/y = du/(x+y)

On taking I + III and II ,

we get (u+x) / y = C1

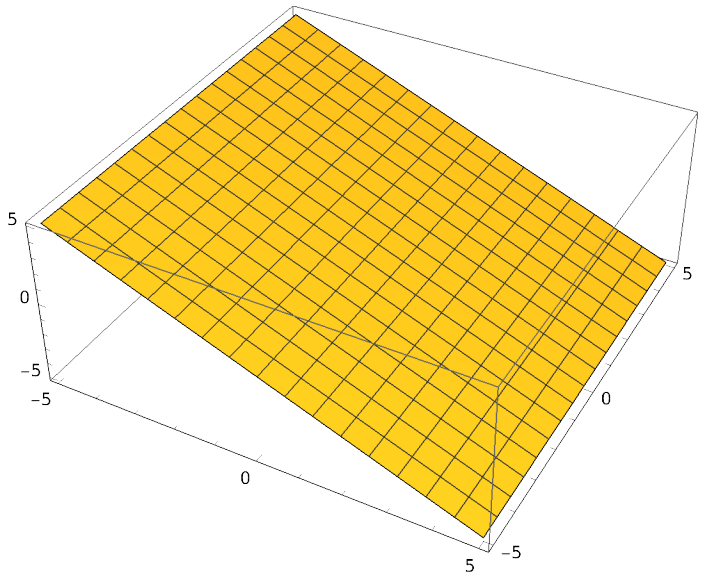
On taking I + II = III,

we get (x+y)^2 - u^2 = C2

Now we Integrate to plot these for some particular values

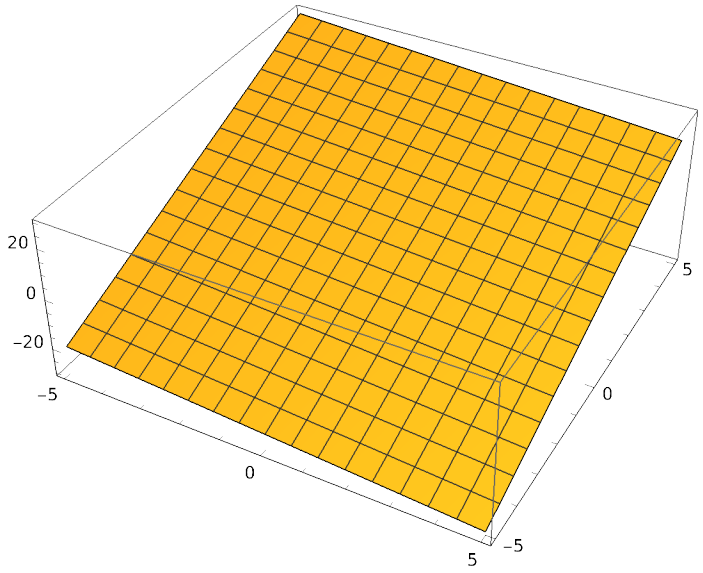
In[40]:=
```
F0 = Plot3D[-x, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[40]=



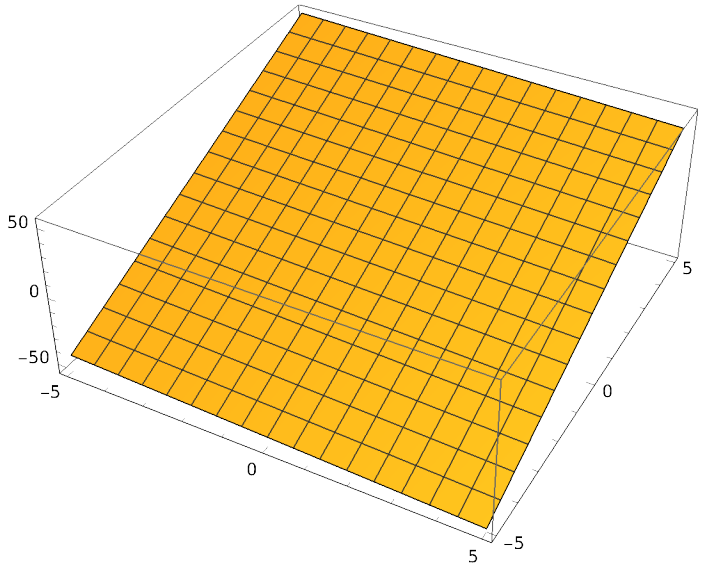
In[41]:=
```
F1 = Plot3D[5 * y - x, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[41]=



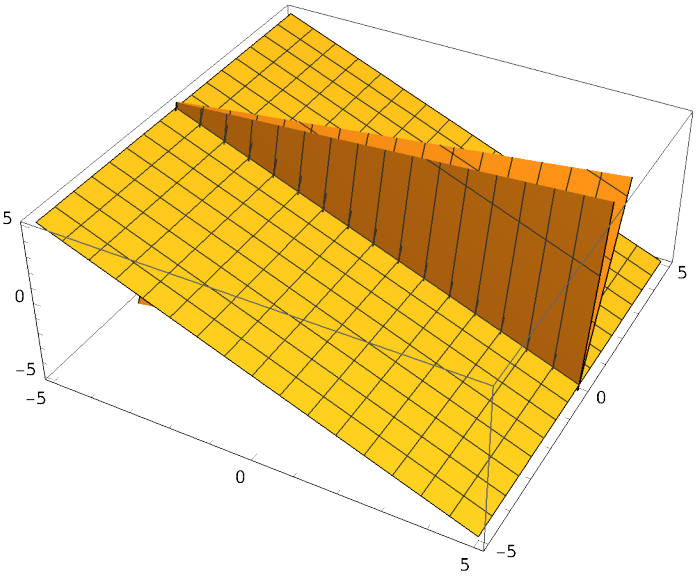
In[42]:=
```
F2 = Plot3D[10 * y - x, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[42]=



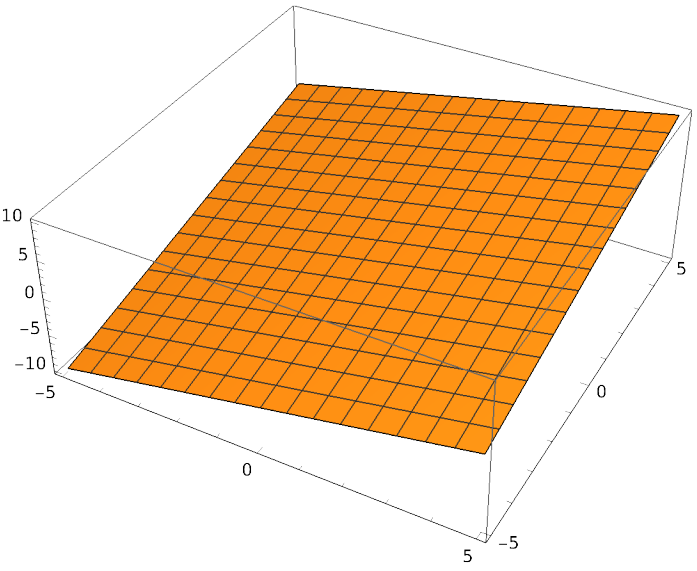
In[43]:=
```
G1 = Show[F0, F1, F2]
```

Out[43]=



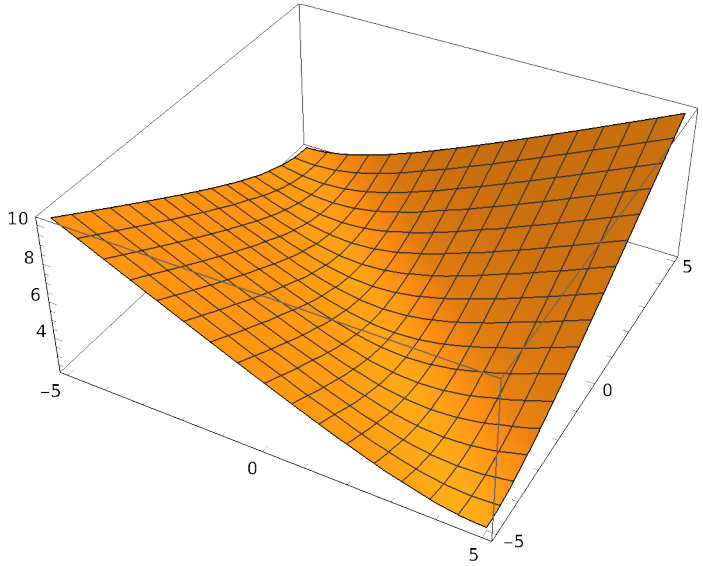
In[44]:=
```
H0 = Plot3D[x + y, {x, −5, 5}, {y, −5, 5}, PlotPoints → 10]
```

Out[44]=



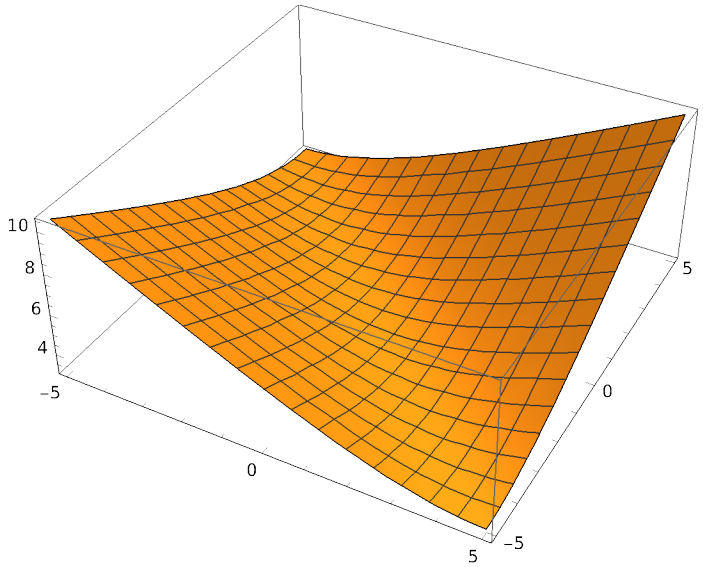
In[45]:=
```
H1 = Plot3D[Sqrt[(x + y)^2 + 5], {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[45]=



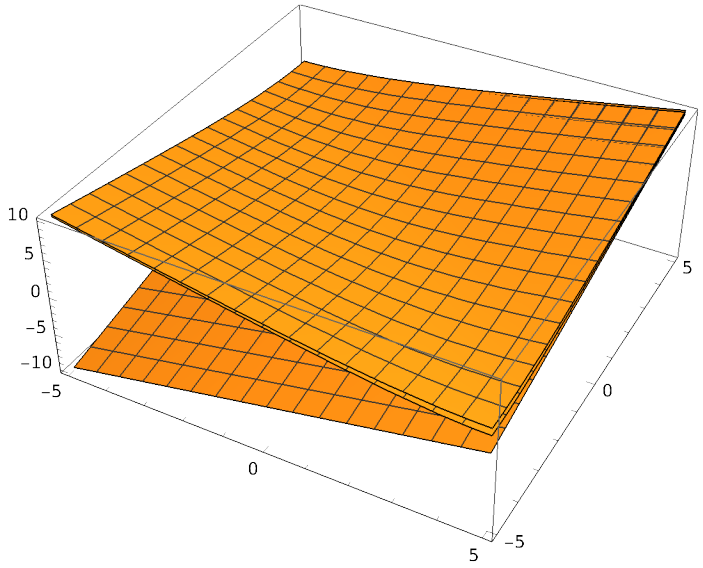
In[46]:=
```
H2 = Plot3D[Sqrt[(x + y)^2 + 10], {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[46]=



In[47]:=
```
G2 = Show[H0, H1, H2]
```

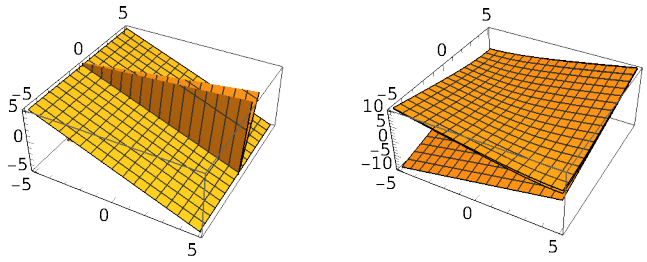
Out[47]=



In[48]:=
```
Show[GraphicsArray [{G1, G2}]]
```

GraphicsArray : GraphicsArray is obsolete . Switching to GraphicsGrid .

Out[48]=



Find the Characteristic Equation of the Curve (u-y)*ux + y* uy = x+y

dx/(x) = dy/y = du/(u)

On taking I and III ,

we get x / u = C1

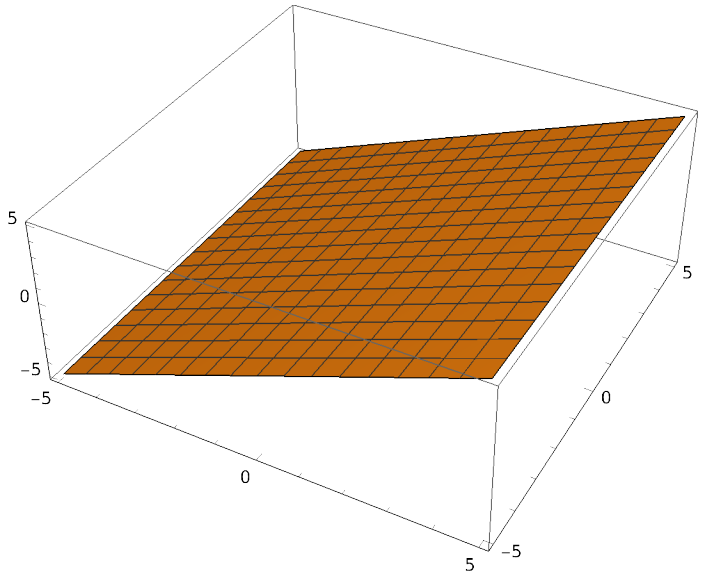
On taking II = III,

we get y / u = C2

Now we Integrate to plot these for some particular values

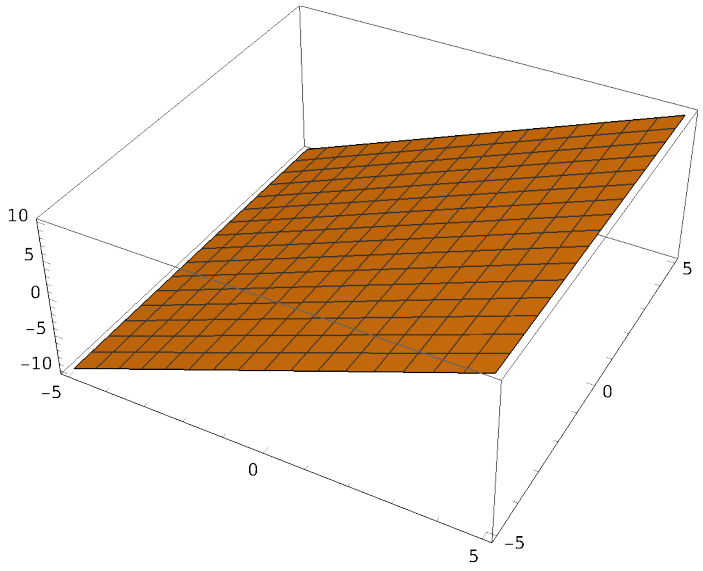
In[49]:=
```
F0 = Plot3D[x, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[49]=



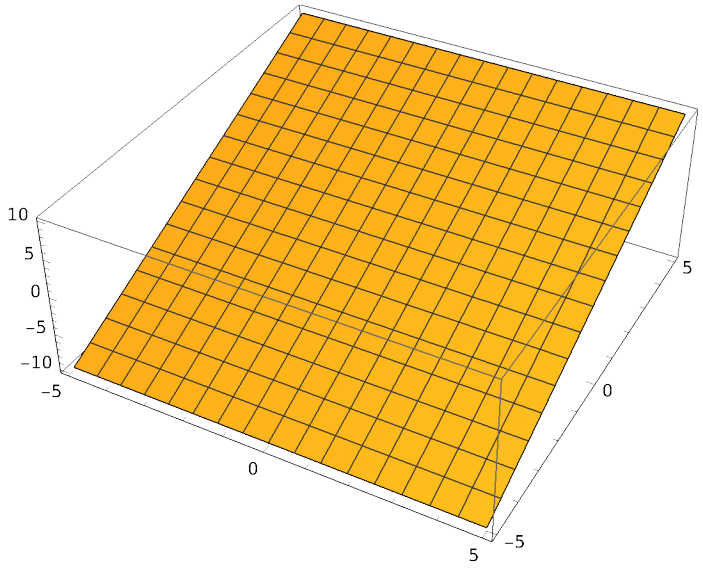
In[51]:=
```
F1 = Plot3D[2 x, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[51]=



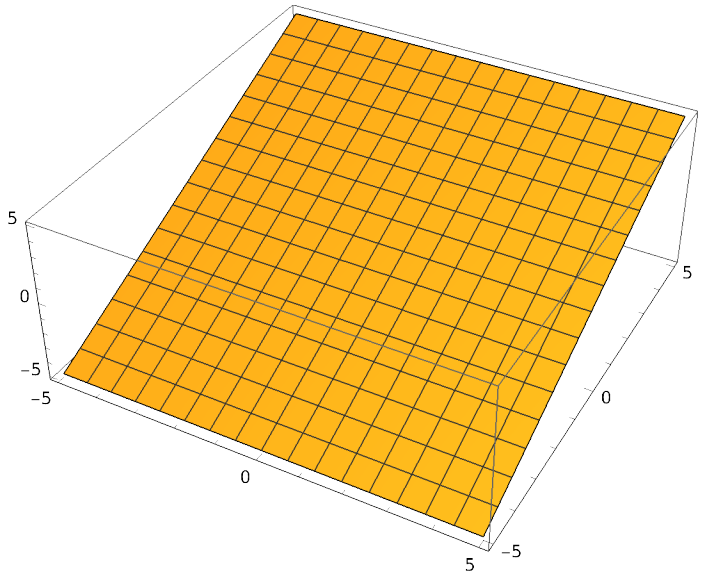
In[52]:=
```
H0 = Plot3D[2 y, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[52]=



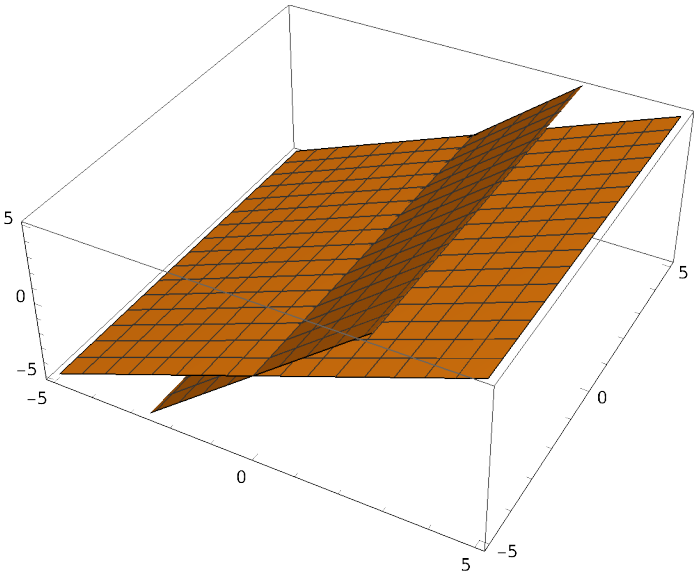
In[53]:=
```
H1 = Plot3D[y, {x, -5, 5}, {y, -5, 5}, PlotPoints → 10]
```

Out[53]=



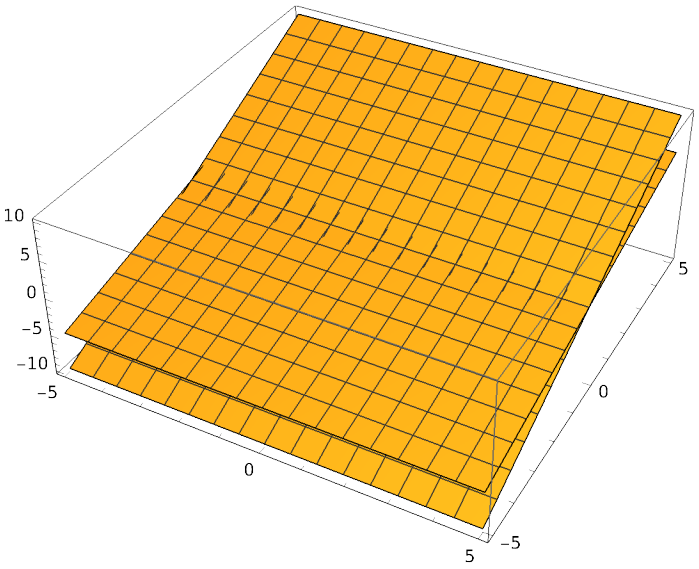
In[54]:=
```
G1 = Show[F0, F1]
```

Out[54]=



In[55]:=
```
G2 = Show[H0, H1]
```

Out[55]=



In[56]:=
```
Show[GraphicsArray [{G1, G2}]]
```

GraphicsArray : GraphicsArray is obsolete . Switching to GraphicsGrid .

Out[56]=