Mie Theory Assignment : 3

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Importing necessary libraries

In [256]:
```
import math
import numpy as np
import matplotlib.pyplot as plt
from scipy.special import eval_legendre
```

Definition and assignment of variables g and u

In [268]:
```
g=0.8
u = np.arange(-1,1+0.01,0.01)
```

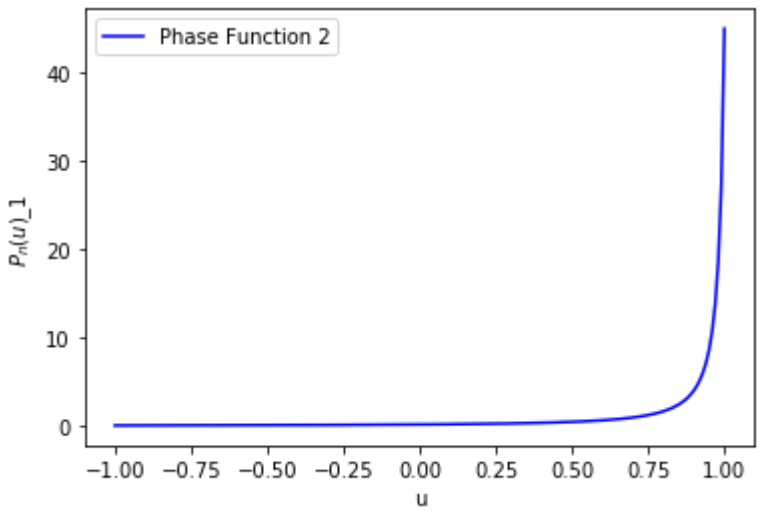
Phase Function 1

In [270]:
```
p = []
for i in u:
    x = ((1-g*g))/ (1-(2*g*i)+(g*g))**1.5
#     print(x)
    p.append(x)
```

Plot of Phase Function 1

In [271]:
```
plt.xlabel("u")
plt.ylabel(r'$P_n(u)$_1')
plt.plot(u,p, color = 'Blue', label = 'Phase Function 2')
plt.legend()
```

Out[271]:
```
<matplotlib.legend.Legend at 0x7fa2b1b7f7d0>
```



Phase Function 2

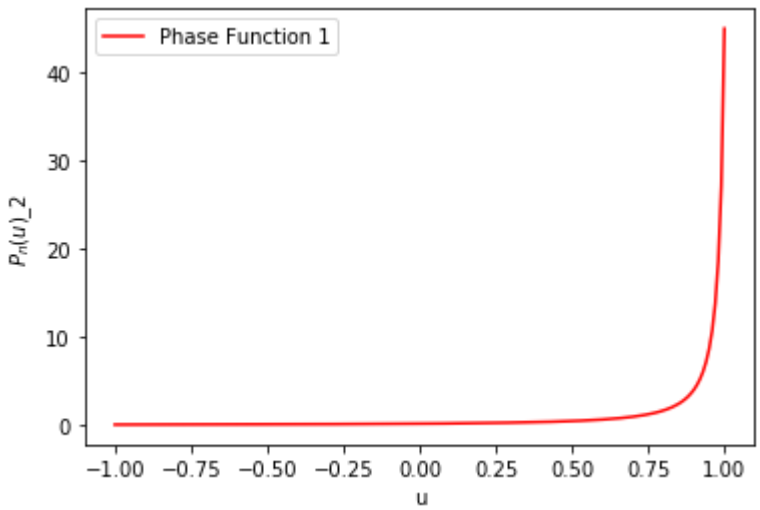
In [272]:
```
q=[]
for i in u:
    y=0
    for n in range(0,500):
        y = y + (((2*n)+1)*(g**n)*eval_legendre(n,i))

#     print(y)
    q.append(y)
```

Plot of Phase Function 2

In [273]:
```
plt.xlabel("u")
plt.ylabel(r'$P_n(u)$_2')
plt.plot(u,q, color = 'Red', label = 'Phase Function 1')
plt.legend()
```

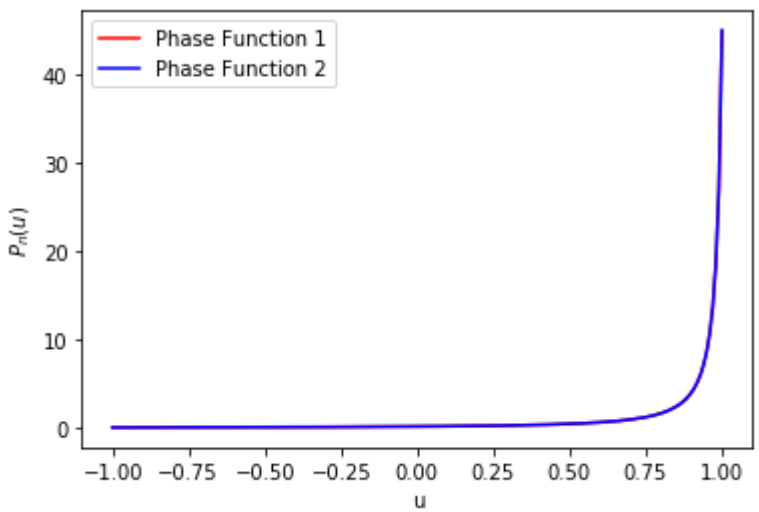
Out[273]:
```
<matplotlib.legend.Legend at 0x7fa2b1c3e990>
```



Plotting both Phase Function 1&2 in the same graph

In [274]:
```
plt.xlabel("u")
plt.ylabel(r'$P_n(u)$')
plt.plot(u,q, color = 'Red', label = 'Phase Function 1')
plt.plot(u,p, color = 'Blue', label = 'Phase Function 2')
plt.legend()
```

Out[274]:
```
<matplotlib.legend.Legend at 0x7fa2b1d58f50>
```



Conclusion: The results produced by both the phase functions are same as we can see that the graphs are overlay on each other perfectly.

In [ ]: