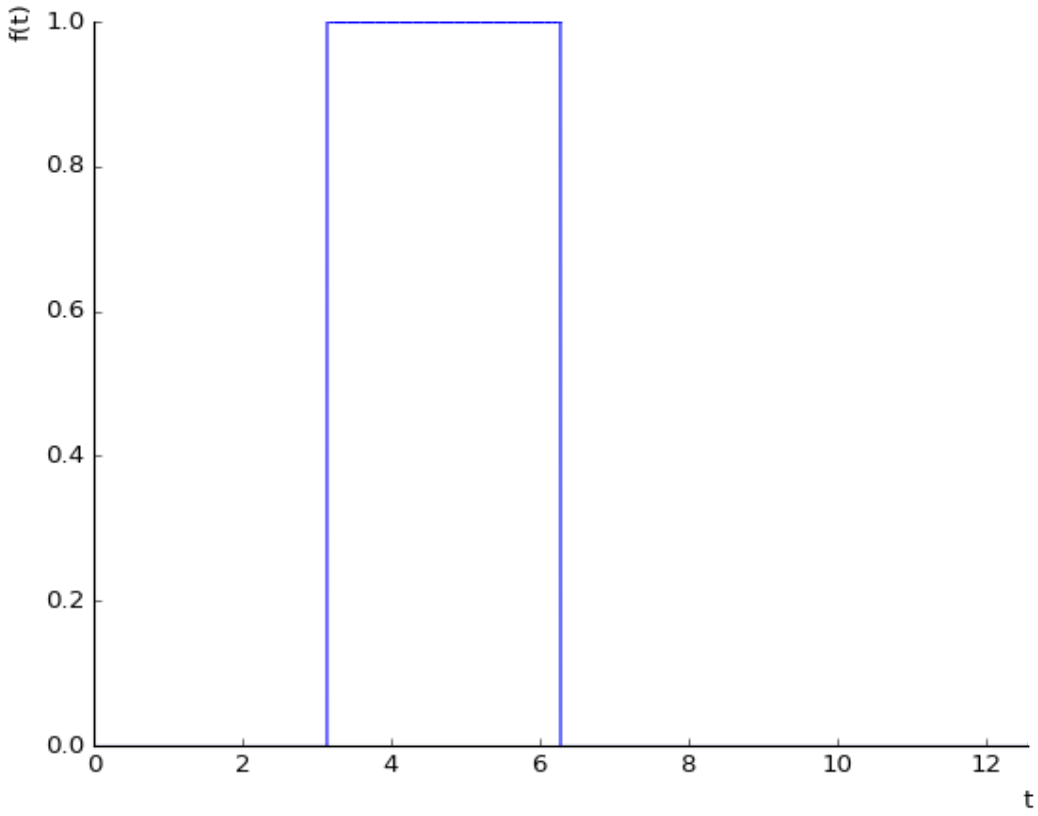
In [1]:
```
from sympy import *
```

Example 1: Sketch the graph of u_pi(t) - u_2pi(t)

In Python, the heaviside function u_c(t) is entered as **Heaviside(t-c)**

In [2]:
```
matplotlib notebook
```

In [3]:
```
t=symbols('t')
# Heaviside defaults to "switch on" at 0.  Use shifts to get the right one.
f=Heaviside(t-pi)-Heaviside(t-2*pi)
plot(f,(t,0,4*pi))
```



Out[3]:
```
<sympy.plotting.plot.Plot at 0x7f3dc3bb8b70>
```

Example 2: (SKIP: Python will not convert piecewise functions to Heavisides)

Example 3: Find the Laplace transform of f(t)={ 9 if t<3; t^2 if 3<=t<4; 0 if t>=4

In [6]:
```
s,t=symbols('s t',positive=True)
# Write f using Heavisides:
f=9+Heaviside(t-3)*(t**2-9)+Heaviside(t-4)*(0-t**2)
F=laplace_transform(f,t,s)  # again we only want the 0th item in the list w
here s>0
print('The Laplace Transform of f is',F[0])
# Try expanding to make it look like ours
print(F[0].expand())
```

```
The Laplace Transform of f is (9*s**2*exp(4*s) - 16*s**2 + 6*s*exp(s) - 8*s
+ 2*exp(s) - 2)*exp(-4*s)/s**3
9/s - 16*exp(-4*s)/s + 6*exp(-3*s)/s**2 - 8*exp(-4*s)/s**2 + 2*exp(-3*s)/s*
*3 - 2*exp(-4*s)/s**3
```

Example 4: Find the Laplace transform of the function graphed in the Examples

In [7]:
```
s,t=symbols('s t',positive=True)
f=0+Heaviside(t-2)*(2*t-4)+Heaviside(t-6)*(8-(2*t-4))
F=laplace_transform(f,t,s)  # again we only want the 0th item in the list w
here s>0
print('The Laplace Transform of f is',F[0])
# Try expanding to make it look like ours
print(F[0].expand())
```

```
The Laplace Transform of f is (2*exp(4*s) - 2)*exp(-6*s)/s**2
2*exp(-2*s)/s**2 - 2*exp(-6*s)/s**2
```

Example 5: Find the inverse Laplace transform of F(s)= (1 - e^(-2s)) / s^2

In [6]:
```
s,t=symbols('s t',positive=True)
F=(1-exp(-2*s))/s**2
inverse_laplace_transform(F,s,t)
```

Out[6]:
```
t - (t - 2)*Heaviside(t - 2)
```

In [ ]:
```

```