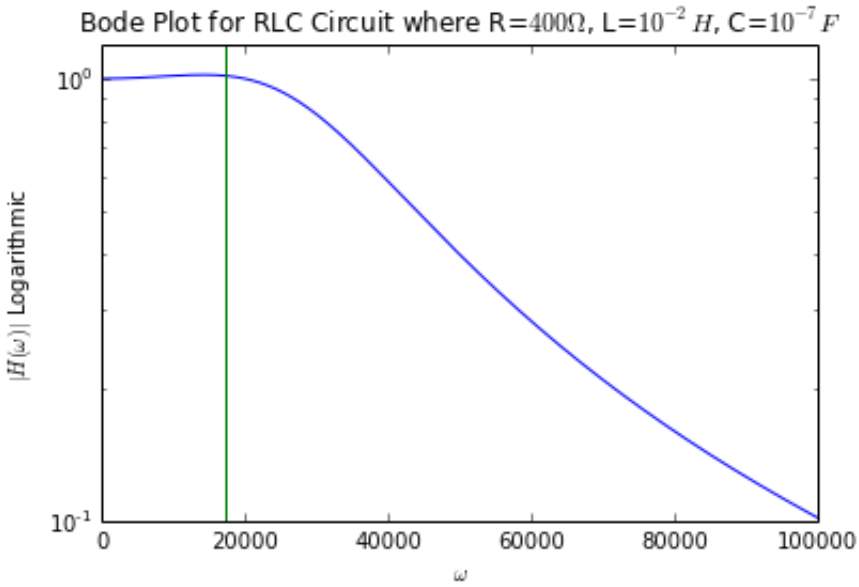
Problem Set 8 - Mitchell Kwock - Problem 3e

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:
```
def getRLC(w, r, l, c):
    '''
    Function returning the complex response of the system
    '''
    return 1.0/(1 + w * r * c * 1j - w * w * l * c)

def rlcHigh(r, l, c):
    '''
    Calculate location of the "Max".  Derivation found on homework
    '''
    front = c / 2.0
    mid = 2 * l + 3 * r * r * c
    back = r * (6 * c * l + 9 * r * r * c * c)
    u = (front * (mid - back))
    omega = u ** -0.5
    return omega
```

In [3]:
```
r = 400
l = 1e-2
c = 1e-7

omegas = np.linspace(0, 100000, 1001)
response = [np.abs(getRLC(w, r, l, c)) for w in omegas]
high = rlcHigh(r, l, c)

fig = plt.figure()
ax = fig.add_subplot(1, 1, 1)
ax.set_yscale('log')
plt.plot(omegas, response)
plt.plot([high, high], [1e-1, 1.2])
plt.ylim([1e-1, 1.2])
plt.title('Bode Plot for RLC Circuit where R=$400\Omega$, L=$10^{-2}H$, C=$1
0^{-7}F$')
plt.xlabel('$\omega$')
plt.ylabel('$|H(\omega)|$ Logarithmic')
```

Out[3]: <matplotlib.text.Text at 0xaa87c18>



In [4]:
```
r = 50
l = 1e-2
c = 1e-7

omegas = np.linspace(0, 100000, 1001)
response = [np.abs(getRLC(w, r, l, c)) for w in omegas]
high = rlcHigh(r, l, c)

fig = plt.figure()
ax = fig.add_subplot(1, 1, 1)
ax.set_yscale('log')
plt.plot(omegas, response)
plt.plot([high, high], [1e-1, 10])
plt.ylim([1e-1, 10])
plt.title('Bode Plot for RLC Circuit where R=$50\Omega$, L=$10^{-2}H$, C=$1
0^{-7}F$')
plt.xlabel('$\omega$')
plt.ylabel('$|H(\omega)|$ Logarithmic')
```

Out[4]: <matplotlib.text.Text at 0xb0b14e0>