In [1]:

```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Suppose we have the function

$$\frac{1}{1-x}$$

Let's

1. define the function
2. plot the function on [-1,1)

In [2]:

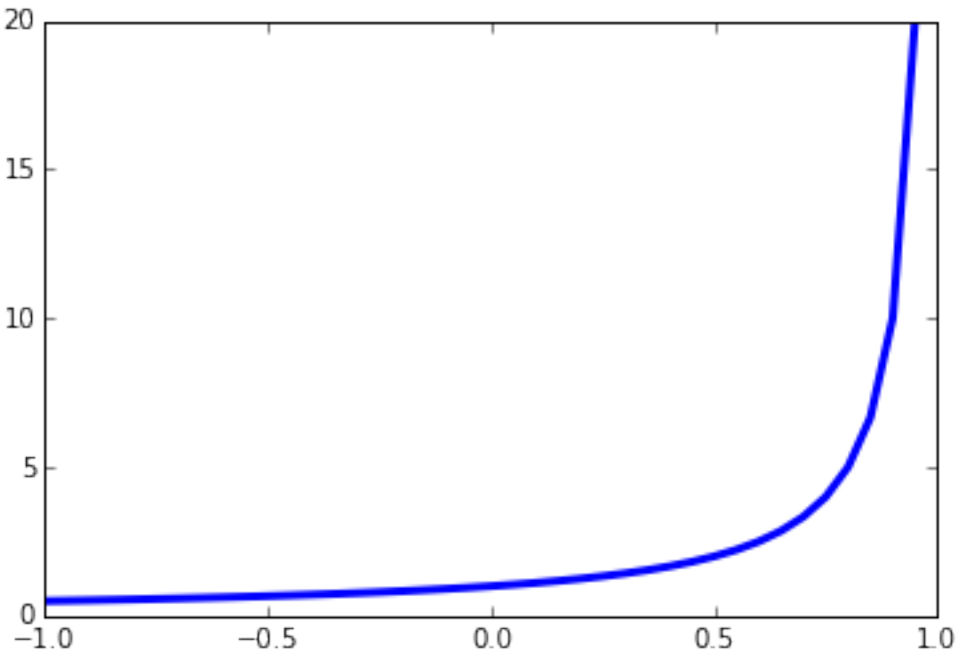
```
def f(x):
    return 1.0 / (1.0 - x)
```

In [13]:

```
xx = np.linspace(-1,1,40, endpoint=False)
plt.plot(xx, f(xx), '-', lw=3)
plt.axis([-1,1,0,20])
```

Out[13]:

```
[-1, 1, 0, 20]
```



What happens here? The function is *singular* at $x = 1$.

In [14]:

```
def taylor(x, k):
    """
    Return the Taylor expasion (about 0) with k terms
    """
    ret = 0
    for i in range(k):
        ret += x**i
    return ret
```

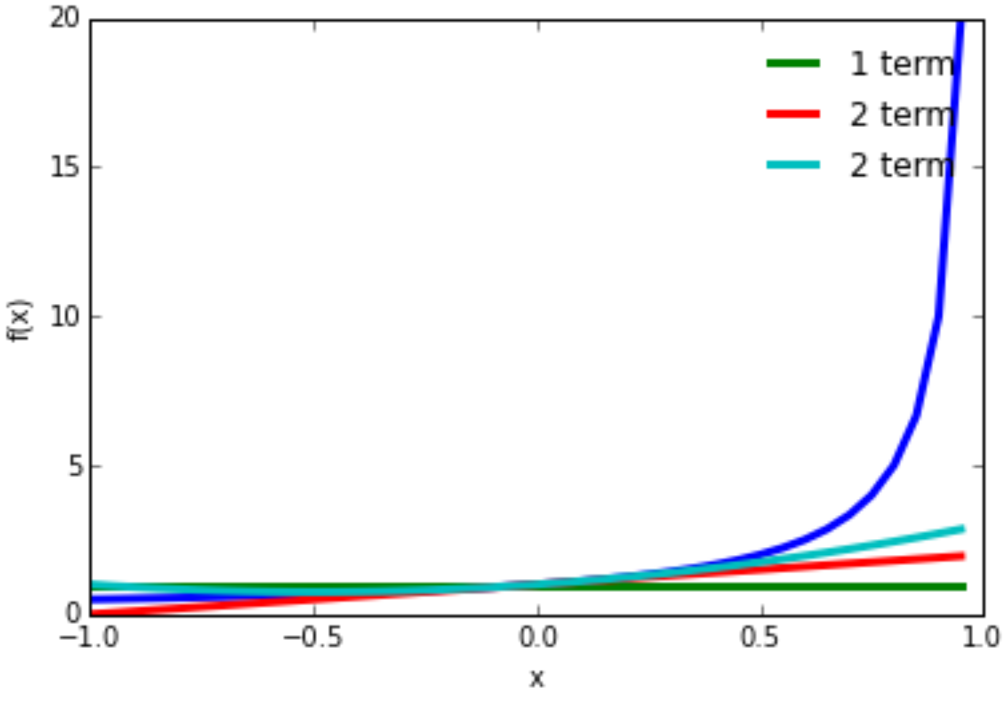
Now let's plot some expansions:

In [21]:

```
xx = np.linspace(-1,1,40, endpoint=False)
plt.plot(xx, f(xx), '-', lw=3)

plt.plot(xx, taylor(xx, 1), '-', lw=3, label='1 term')
plt.plot(xx, taylor(xx, 2), '-', lw=3, label='2 term')
plt.plot(xx, taylor(xx, 3), '-', lw=3, label='2 term')



plt.axis([-1,1,0,20])
plt.xlabel('x')
plt.ylabel('f(x)')
plt.legend(frameon=False)
```

Out[21]:

```
<matplotlib.legend.Legend at 0x109836ef0>
```



What happens to the approximation of $f(x)$ with a Taylor series about $x = 0$ when evaluated at $x = 1$?

When evaluated at $x = -1$?

```
In [ ]:
```