In [2]:

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

This is the stock price one time interval away (accumulated) using geometric Brownian motion:

$$S_T = S_t e^{(r-\frac{\sigma^2}{2})(T-t)+\sigma\sqrt{T-t}\epsilon}$$

In [3]:

```
def St(r, sigma, t):
    ret = 1.0 * np.exp((r - 0.5 * sigma**2) * t + sigma * np.sqrt(t[1]-t[0]) * n
p.cumsum(np.random.randn(len(t))))
    return ret
```

Now let's plot in the interval $t \in [0, 1]$ with `r=1` or `r=0.5` and for different `sigma`

In [7]:

```
t = np.linspace(0,1,200)
plt.plot(t, St(1, 0.2, t), label='$r=1$, $\sigma=0.2$')
plt.plot(t, St(1, 0.5, t), label='$r=1$, $\sigma=0.5$')
plt.plot(t, St(0.5, 0.5, t), label='$r=0.5$, $\sigma=0.5$')
plt.legend()
```

Out[7]:

```
<matplotlib.legend.Legend at 0x10cd9b828>
```