

In [8]:

```
import numpy as np
```

In [9]:

```
def prob(alpha,B_integer,z):  
    t = abs(z - B_integer)  
    return (1 - alpha) / (1 + alpha) * (alpha ** t)
```

In [10]:

```
# N_list = [i for i in range(1000,100000,1000)]  
N = 100000  
result_list = []  
numerator,denominator = np.zeros(4),0  
target = [1,4,7,9]  
for i in range(N):  
    B = np.random.choice([0,1],size = 10, p = [.5,.5])  
    B_integer = int("".join(str(B[i]) for i in range(len(B)-1,-1,-1)),2)  
    probability = prob(0.1,B_integer,128)  
    for j in range(4):  
        numerator[j] += B[target[j]] * probability  
    denominator += probability  
    if i % 100 == 0 and i >= 1000:  
        result_list.append(numerator / denominator)
```

In [11]:

```
result_list = np.array(result_list)  
result = result_list.T
```

In [12]:

```
result.shape
```

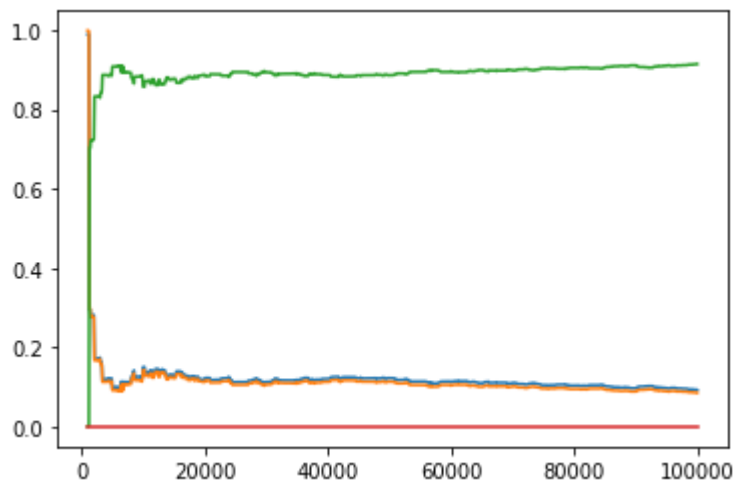
Out[12]:

```
(4, 990)
```

In [13]:

```
from matplotlib import pyplot as plt
x_axis = [i for i in range(1000,100000,100)]
print(len(x_axis))
plt.plot(x_axis,result[0],x_axis,result[1],x_axis,result[2],x_axis,result[3])
plt.show()
```

990



In []: