prob1

December 16, 2015

In [40]:
```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

In [41]:
```
# input data
X = np.array([[0,1],[0.5,2]])
y = np.array([2,5])

x_star = np.array([0.5, 1])

# squared exponential kernel function
def se(X):
    D = X[:,:,np.newaxis] - X.T
    return np.exp(-1/2*np.sum(D**2, axis=1))
```

In [42]:
```
# compute the covariance matrix using the se-kernel function
Ka = se( np.concatenate((X,X_star),0) )

K = Ka[:2,:2]
K_star = Ka[:2,2]
K_starstar = Ka[2,2]
```

In [43]:
```
print('K:')
print(K)
print()
print('K*:')
print(K_star)
print()
print('K**:')
print(K_starstar)
```

```
K:
[[ 1.          0.53526143]
 [ 0.53526143  1.        ]]

K*:
[ 0.8824969   0.60653066]

K**:
1.0
```

In [44]:
```
# compute the mean expectation and the variance
mu = K_star.dot(np.linalg.inv(K)).dot(y)
var = K_starstar - K_star.dot( np.linalg.inv(K).dot(K_star) )
```

```
In [45]: print('f*|f,X,X* ~ N(%f, %f)' % (mu, var))
```

```
f*|f,X,X* ~ N(2.503884, 0.195971)
```

```
In [ ]:
```