In [3]:
```
from sol_3a1 import *
import matplotlib.pyplot as plt
```

dataset1 result

	loss = NLL	alpha_hat	sigma_hat	Z_hat
mode11	80.94710727457094	1e-06	2742.907868619646	None
model2	80.34049376533933	54.674196526383206	2542.715511207578	[302.39512784 299.98729093]
model3	80.40741481452056	1e-06	2651.8960431941096	None

dataset2 result

	loss = NLL	alpha_hat	sigma_hat	Z_hat
mode11	533435.0080889168	22.274354563080006	2515.1732607200665	None
mode12	533488.2228744307	298.5601754764213	2519.525066776425	[300.13923787 299.94610773]
mode13	533218.2923134756	11.81695054460237	2505.7351321647266	None

Dataset 1

In [13]:
```
log_evidence1, evidence1 = compute_evidence(loss=80.94710727457094, alpha_hat=1e
```

```
-348.1763260173209 6.150959695998708e-152
```

In [14]:
```
log_evidence2, evidence2 = compute_evidence(loss=80.34049376533933, alpha_hat=54
```

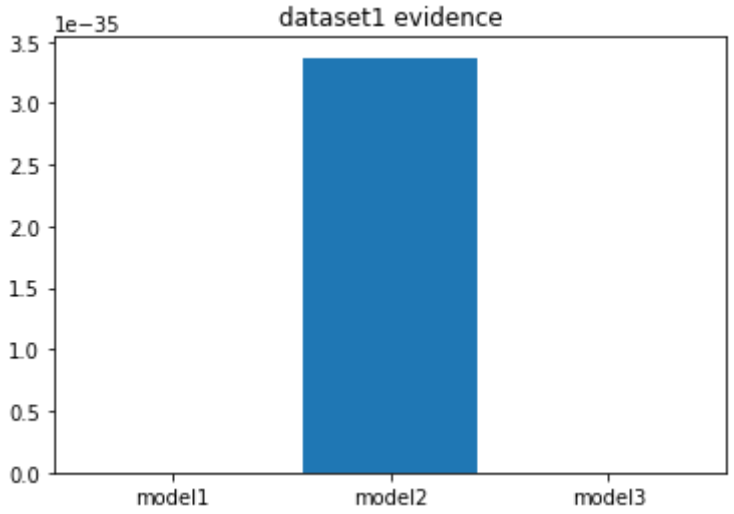
```
-79.37586775492639 3.368981589950336e-35
```

In [15]:
```
log_evidence3, evidence3 = compute_evidence(loss=80.40741481452056, alpha_hat=1e
```

```
-346.7627993877606 2.52830635668627e-151
```

In [21]:
```
data = [log_evidence1, log_evidence2, log_evidence3]
label = ["model1","model2","model3"]
plt.bar(range(len(data)), data, tick_label=label)
plt.title('dataset1 logevidence')
plt.show()
```

In [22]:
```
data = [evidence1, evidence2, evidence3]
label = ["model1","model2","model3"]
plt.bar(range(len(data)), data, tick_label=label)
plt.title('dataset1 evidence')
plt.show()
```



Dataset 2

In [6]:
```
x=np.array([float(xi) for xi in scio.loadmat('./hw2files/occam2.mat')['x']], dty
```

In [4]:
```
log_evidence1, evidence1 = compute_evidence(loss=533435.0080889168, alpha_hat=22
```

```
-614631.3936193986 0.0
```

In [13]:
```
log_evidence2, evidence2 = compute_evidence(loss=533488.2228744307, alpha_hat=29
```

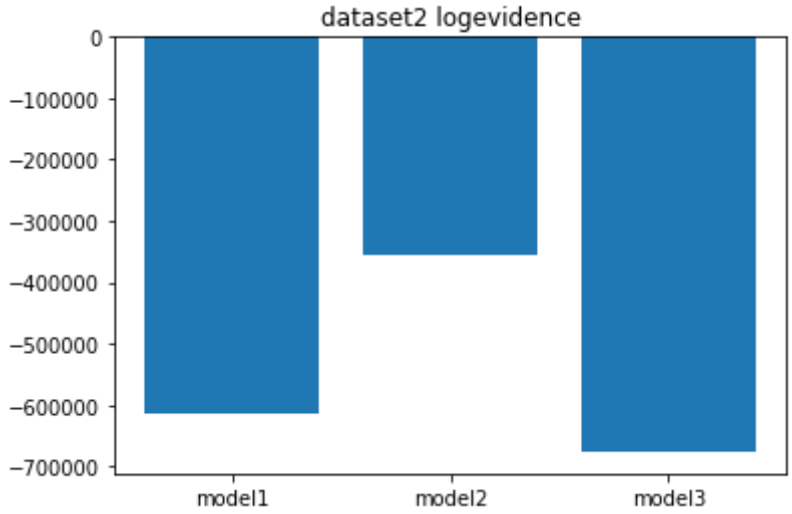
```
-355187.3938336382 0.0
```

In [14]:
```
# 533218.2923134756 11.81695054460237 2505.7351321647266 None
log_evidence3, evidence3 = compute_evidence(loss=533218.2923134756, alpha_hat=11
```

```
-677589.2313579913 0.0
```

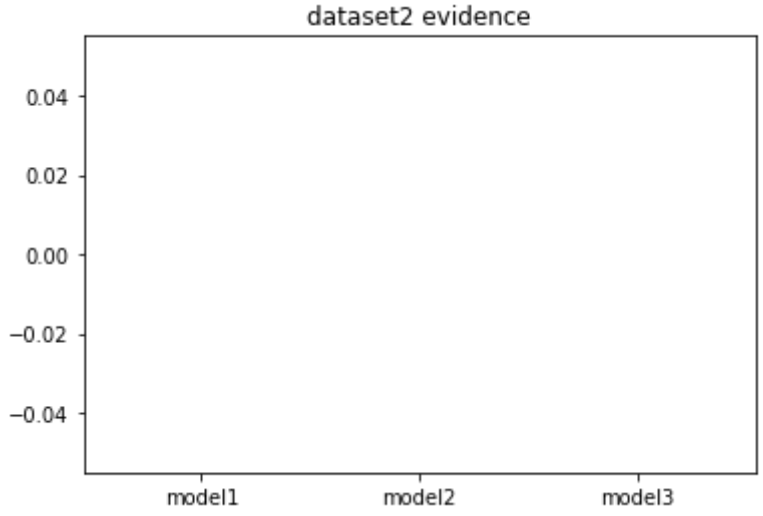
In [16]:

```
data = [log_evidence1, log_evidence2, log_evidence3]
label = ["model1","model2","model3"]
plt.bar(range(len(data)), data, tick_label=label)
plt.title('dataset2 logevidence')
plt.show()
```



In [17]:

```
data = [evidence1, evidence2, evidence3]
label = ["model1","model2","model3"]
plt.bar(range(len(data)), data, tick_label=label)
plt.title('dataset2 evidence')
plt.show()
```



Posterior

In [33]:

```
phi = phi2
alpha_hat = 298.5601754764213
sigma_hat = 2519.525066776425
z_hat = [300.13923787,299.94610773]
param_shape = 2
```

In [29]:
```
y=np.array([float(xi) for xi in scio.loadmat('./hw2files/occam2.mat')['y']], dty
```

In [28]:
```
phi_x = phi(x, z_hat)
```

In [26]:
```
m_0 = np.zeros(2)
print(m_0)
```

```
[0. 0.]
```

In [34]:
```
S_N = (1 / alpha_hat) * np.identity(param_shape) + (1 / sigma_hat) * phi_x.T @ p
m_N = np.linalg.inv(S_N) @ ((1 / alpha_hat) * np.identity(param_shape) @ m_0 + (
```

refer to bishop, we have the posterior update equation

we get posterior

mean = [-1.05609318 3.05200373]

variance = [[39.67203114 39.67567358] [39.67567358 39.68601867]]

In [35]:
```
print(m_N,S_N)
```

```
[-1.05609318  3.05200373] [[39.67203114 39.67567358]
 [39.67567358 39.68601867]]
```

In [ ]:
```

```