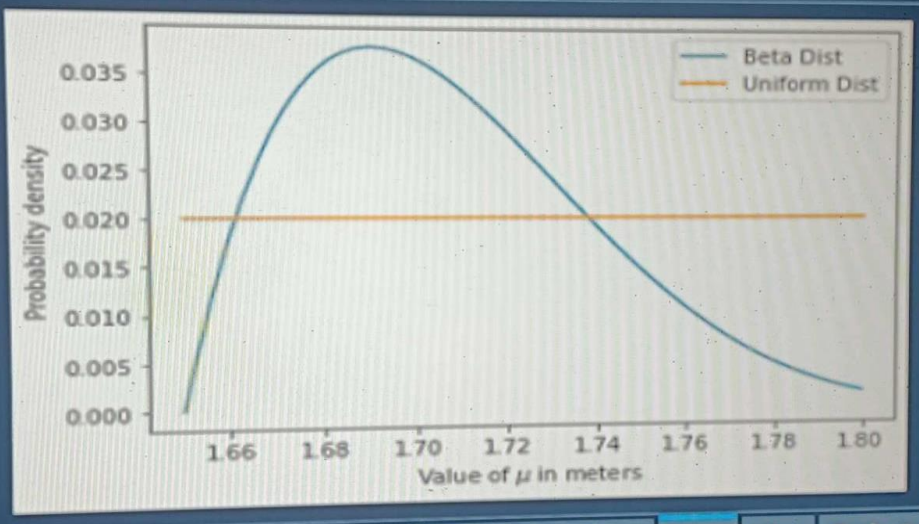
```
Walther Lewis T. Zipagan III

CAS-05-601P

"""

Created on Thu Mar 09 18:20:02 2024

@author: WLTZipaganIII

"""

import scipy.stats as sts

import numpy as np

import matplotlib.pyplot as plt


mu = np.linspace(1.65, 1.8, num = 50)

test = np.linspace(0, 2)

uniform_dist = sts.uniform.pdf(mu) + 1 #sneaky advanced note: I'm using the uniform distribution for clarity,

                                       #but we can also make the beta distribution look completely flat by tweaking alpha and beta!

uniform_dist = uniform_dist/uniform_dist.sum() #Normalizing the distribution to make the probability densities sum into 1

beta_dist = sts.beta.pdf(mu, 2, 5, loc = 1.65, scale = 0.2)

beta_dist = beta_dist/beta_dist.sum()

plt.plot(mu, beta_dist, label = 'Beta Dist')

plt.plot(mu, uniform_dist, label = 'Uniform Dist')

plt.xlabel("Value of $\mu$ in meters")

plt.ylabel("Probability density")

plt.legend()


def likelihood_func(datum, mu):

 likelihood_out = sts.norm.pdf(datum, mu, scale = 0.1)

 return likelihood_out/likelihood_out.sum()
```

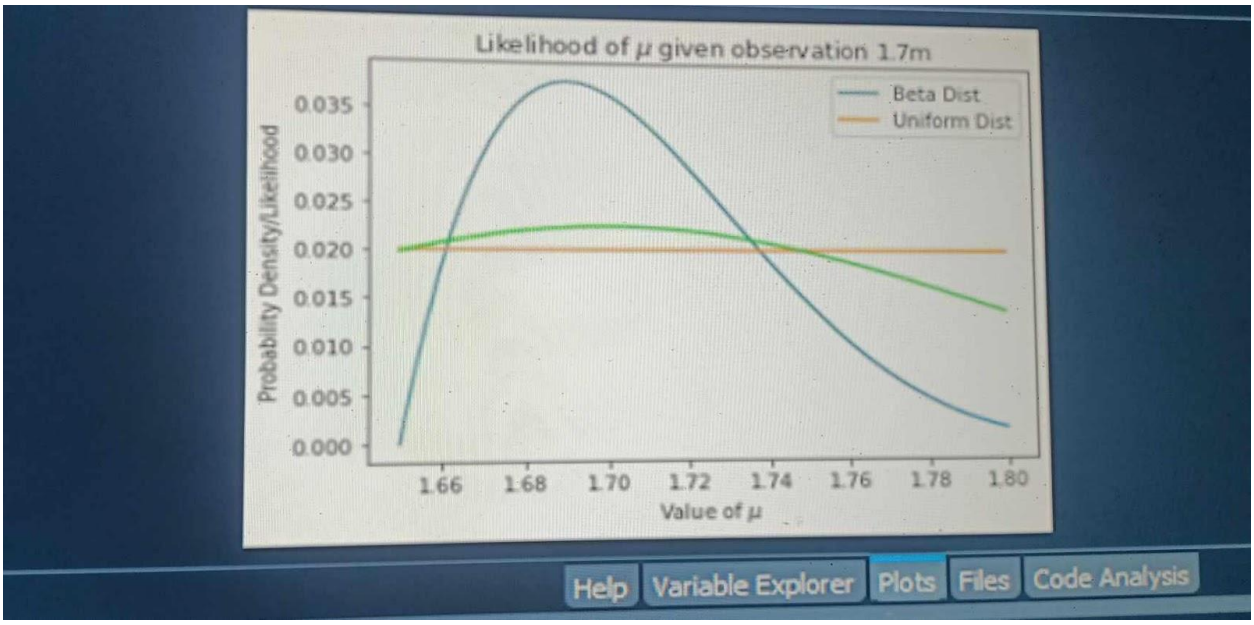
```
likelihood_out = likelihood_func(1.7, mu)

plt.plot(mu, likelihood_out)
plt.title("Likelihood of $\mu$ given observation 1.7m")
plt.ylabel("Probability Density/Likelihood")
plt.xlabel("Value of $\mu$")
plt.show()


import scipy as sp

unnormalized_posterior = likelihood_out * uniform_dist
plt.plot(mu, unnormalized_posterior)
plt.xlabel("$\mu$ in meters")
plt.ylabel("Unnormalized Posterior")
plt.show()
```

```python
# -*- coding: utf-8 -*-
"""
Created on Sat Mar  9 18:20:02 2024

@author: Wltzipagan
"""
import scipy.stats as sts
import numpy as np
import matplotlib.pyplot as plt

mu = np.linspace(1.65, 1.8, num = 50)
test = np.linspace(0, 2)
uniform_dist = sts.uniform.pdf(mu) + 1 #sneaky advanced note: I'm using the uniform distribution for clarity,
                                       #but we can also make the beta distribution look completely flat by tweaking alpha and beta!
uniform_dist = uniform_dist/uniform_dist.sum() #Normalizing the distribution to make the probability densities sum into 1
beta_dist = sts.beta.pdf(mu, 2, 5, loc = 1.65, scale = 0.2)
beta_dist = beta_dist/beta_dist.sum()
plt.plot(mu, beta_dist, label = 'Beta Dist')
plt.plot(mu, uniform_dist, label = 'Uniform Dist')
plt.xlabel("Value of $\mu$ in meters")
plt.ylabel("Probability density")
plt.legend()

```



Help | Variable Explorer | Plots | Files | Code Analysis

```python
# -*- coding: utf-8 -*-
"""
Created on Sat Mar  9 18:20:02 2024

@author: Wltzipagan
"""
import scipy.stats as sts
import numpy as np
import matplotlib.pyplot as plt

mu = np.linspace(1.65, 1.8, num = 50)
test = np.linspace(0, 2)
uniform_dist = sts.uniform.pdf(mu) + 1 #sneaky advanced note: I'm using the uniform distribution for clarity,
                                       #but we can also make the beta distribution look completely flat by tweaking alpha and beta
uniform_dist = uniform_dist/uniform_dist.sum() #Normalizing the distribution to make the probability densities sum into 1
beta_dist = sts.beta.pdf(mu, 2, 5, loc = 1.65, scale = 0.2)
beta_dist = beta_dist/beta_dist.sum()
plt.plot(mu, beta_dist, label = 'Beta Dist')
plt.plot(mu, uniform_dist, label = 'Uniform Dist')
plt.xlabel("Value of $\mu$ in meters")
plt.ylabel("Probability density")
plt.legend()


def likelihood_func(datum, mu):
 likelihood_out = sts.norm.pdf(datum, mu, scale = 0.1)
 return likelihood_out/likelihood_out.sum()

likelihood_out = likelihood_func(1.7, mu)

plt.plot(mu, likelihood_out)
plt.title("Likelihood of $\mu$ given observation 1.7m")
plt.ylabel("Probability Density/Likelihood")
plt.xlabel("Value of $\mu$")
plt.show()
```



```python
# -*- coding: utf-8 -*-
"""
Created on Sat Mar  9 18:20:02 2024

@author: Wltzipagan
"""
import scipy.stats as sts
import numpy as np
import matplotlib.pyplot as plt

mu = np.linspace(1.65, 1.8, num = 50)
test = np.linspace(0, 2)
uniform_dist = sts.uniform.pdf(mu) + 1 #sneaky advanced note: I'm using the uniform distribution for clarity,
                                       #but we can also make the beta distribution look completely flat by tweaking alpha and beta
uniform_dist = uniform_dist/uniform_dist.sum() #Normalizing the distribution to make the probability densities sum into 1
beta_dist = sts.beta.pdf(mu, 2, 5, loc = 1.65, scale = 0.2)
beta_dist = beta_dist/beta_dist.sum()
plt.plot(mu, beta_dist, label = 'Beta Dist')
plt.plot(mu, uniform_dist, label = 'Uniform Dist')
plt.xlabel("Value of $\mu$ in meters")
plt.ylabel("Probability density")
plt.legend()


def likelihood_func(datum, mu):
 likelihood_out = sts.norm.pdf(datum, mu, scale = 0.1)
 return likelihood_out/likelihood_out.sum()

likelihood_out = likelihood_func(1.7, mu)

plt.plot(mu, likelihood_out)
plt.title("Likelihood of $\mu$ given observation 1.7m")
plt.ylabel("Probability Density/Likelihood")
plt.xlabel("Value of $\mu$")
plt.show()
```

```python
import scipy as sp

unnormalized_posterior = likelihood_out * uniform_dist
plt.plot(mu, unnormalized_posterior)
plt.xlabel("$\mu$ in meters")
plt.ylabel("Unnormalized Posterior")
plt.show()
```