COGS118B_D1

January 19, 2024

```python
[1]: # According to https://github.com/jmshea/jupyterquiz/issues/20
     !python -m pip install -q jupyterquiz==2.7.0a1
     from jupyterquiz import display_quiz
```

0.1 Baye's Theorem

```python
[2]: display_quiz("data/bayes.json")
```

    <IPython.core.display.HTML object>

    <IPython.core.display.Javascript object>

0.2 MLE and MAP

```python
[3]: display_quiz("data/mle.json")
```

    <IPython.core.display.HTML object>

    <IPython.core.display.Javascript object>

```python
[ ]:
```

0.3 Plot the Gamma Distribution

```python
[4]: from scipy.stats import gamma
     import numpy as np
     import matplotlib.pyplot as plt
```

Create the values on the x-axis

```python
[5]: # using numpy an array of numbers starting from 0, going up to 20
     x_values = np.arange(0, 20, 0.01)
```

```python
[6]: x_values
```

```python
[6]: array([0.000e+00, 1.000e-02, 2.000e-02, …, 1.997e+01, 1.998e+01,
            1.999e+01])
```

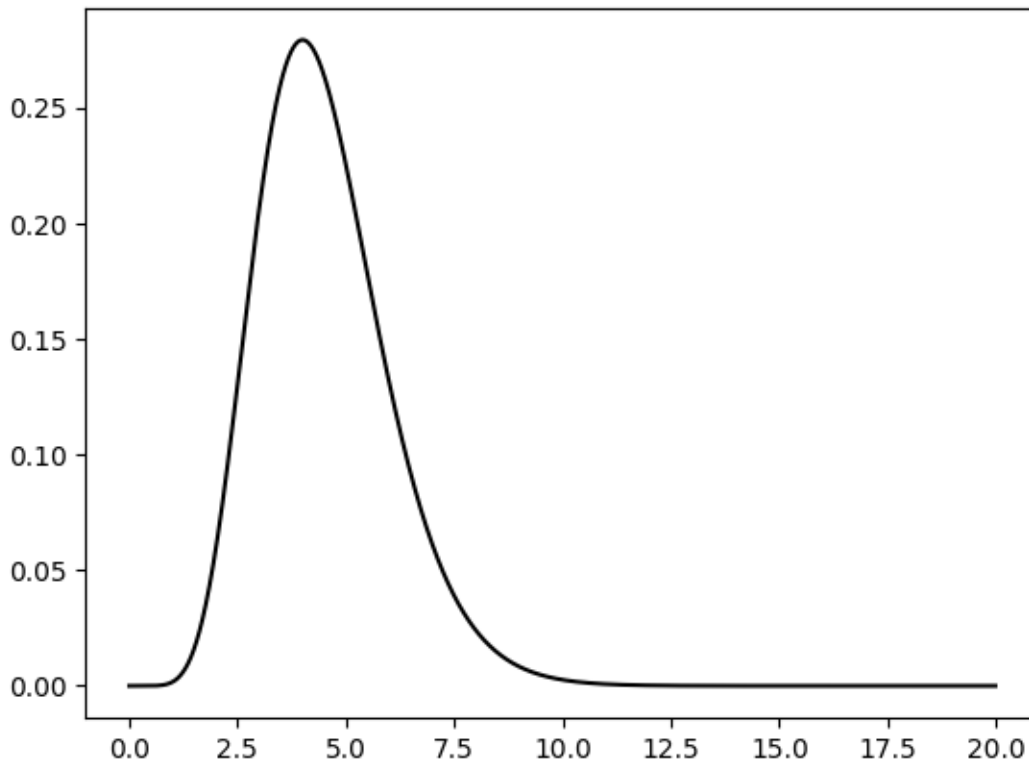Calculate the pdf with k=9(shape parameter) and θ=0.5(scale parameter)

```python
[7]: y_values = [gamma.pdf(x, a=9, scale=0.5) for x in x_values]
```

```
[ ]:
```

Plot the values

```
[9]: plt.plot(x_values, y_values, color='black')
```

```
[9]: [<matplotlib.lines.Line2D at 0x12ecfc970>]
```


Plot the other gamma distribution
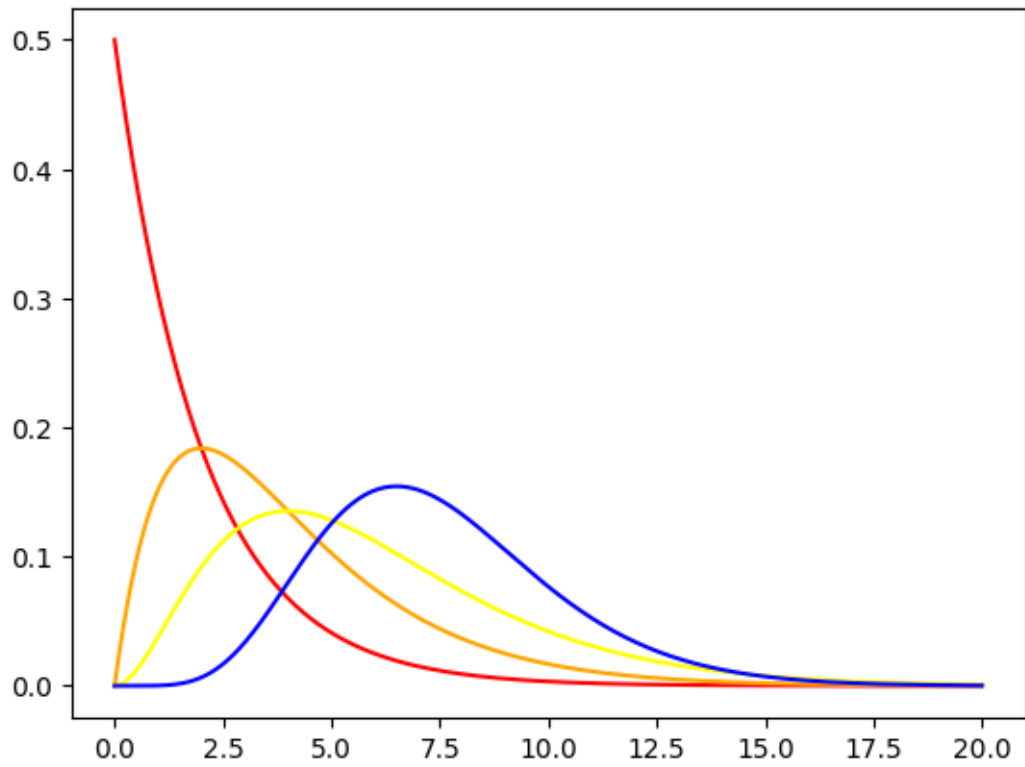
```
[10]: y_values = [gamma.pdf(x, a=1, scale=2) for x in x_values]
      plt.plot(x_values, y_values, color='red')

      y_values = [gamma.pdf(x, a=2, scale=2) for x in x_values]
      plt.plot(x_values, y_values, color='orange')

      y_values = [gamma.pdf(x, a=3, scale=2) for x in x_values]
      plt.plot(x_values, y_values, color='yellow')

      y_values = [gamma.pdf(x, a=7.5, scale=1) for x in x_values]
      plt.plot(x_values, y_values, color='blue')
```

```
[10]: [<matplotlib.lines.Line2D at 0x138307190>]
```

2

[ ]:

0.4 End of DI Week2