

Question2

```
In [1]: import matplotlib.pyplot as plt
import numpy as np
```

```
In [2]: x1 = np.linspace(0,10,1000)
x2 = np.linspace(0,5,1000)
x3 = np.linspace(0,3,1000)
```

lognormal distribution

```
In [3]: def lognormal(mu,sig):
return (1 / (x1 * sig * ((2 * np.pi) ** 0.5))) * np.exp(-(((np.log(x1) - mu) ** 2) / (2 * (sig ** 2))))
```

weibull distribution

```
In [4]: def weibull(c,b):
return (c * (x2 ** (c - 1))) / ((b ** c) * np.exp((x2 / b) ** c))
```

wald distribution

```
In [5]: def wald(eta,lam):
return (((lam) / (2 * np.pi * (x3 ** 3))) ** 0.5) * np.exp((-lam) * (((x3 - eta) ** 2)) / (2 * (eta ** 2) * x3))
```

plot lognormal distribution

```
In [6]: Log11 = lognormal(0,0.25)
Log12 = lognormal(0,0.5)
Log13 = lognormal(0,1)
Log14 = lognormal(0,2)

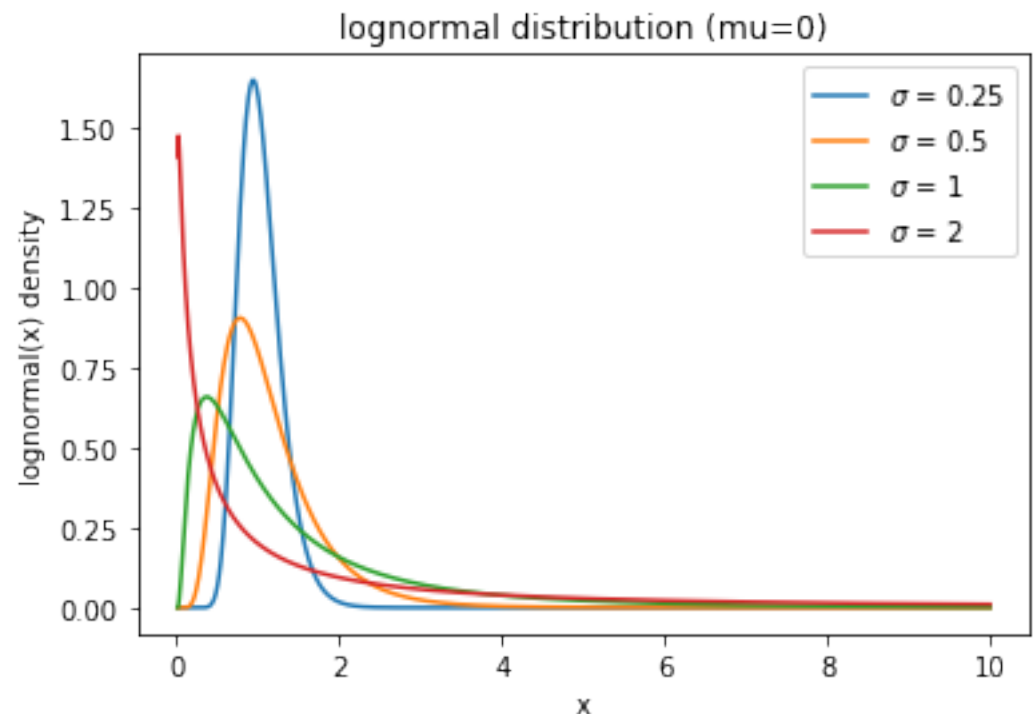
Log21 = lognormal(0,0.5)
Log22 = lognormal(0.5,0.5)
Log23 = lognormal(1,0.5)
Log24 = lognormal(2,0.5)

/Users/Chokeunhee/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: RuntimeWarning: divide by zero encountered in true_divide

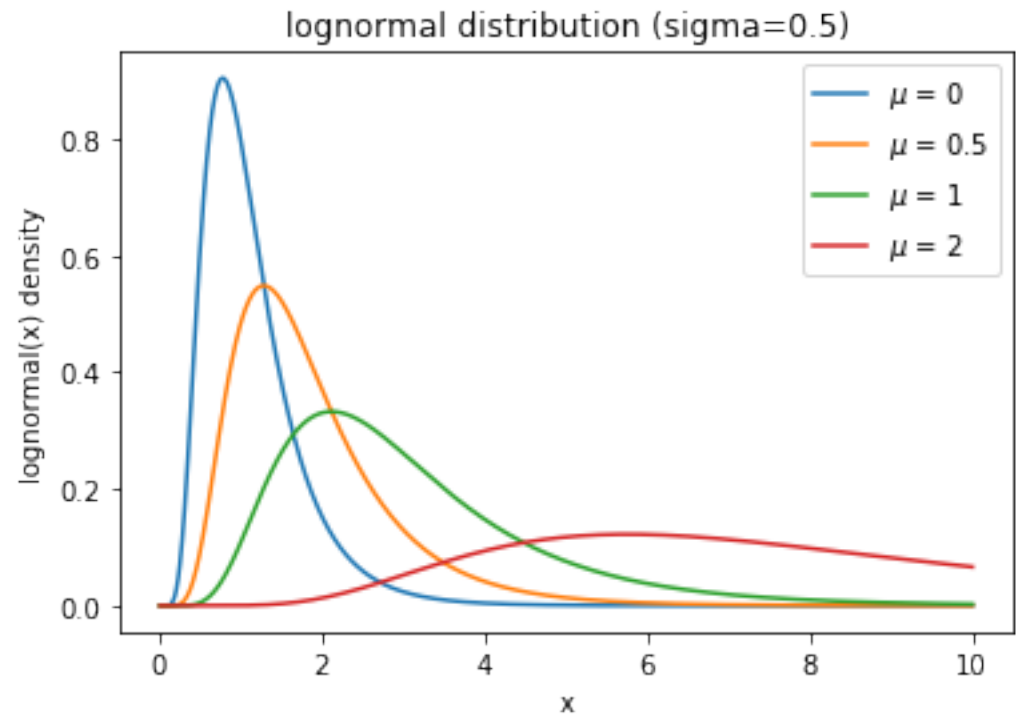
/Users/Chokeunhee/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: RuntimeWarning: divide by zero encountered in log

/Users/Chokeunhee/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: RuntimeWarning: invalid value encountered in multiply
```

```
In [7]: plt.figure(1)
plt.plot(x1,Log11,label=r'$\sigma$ = 0.25')
plt.plot(x1,Log12,label=r'$\sigma$ = 0.5')
plt.plot(x1,Log13,label=r'$\sigma$ = 1')
plt.plot(x1,Log14,label=r'$\sigma$ = 2')
plt.title('lognormal distribution (mu=0)')
plt.xlabel('x')
plt.ylabel('lognormal(x) density')
plt.legend()
plt.show()
```



```
In [8]: plt.figure(2)
plt.plot(x1,Log21,label=r'$\mu$ = 0')
plt.plot(x1,Log22,label=r'$\mu$ = 0.5')
plt.plot(x1,Log23,label=r'$\mu$ = 1')
plt.plot(x1,Log24,label=r'$\mu$ = 2')
plt.title('lognormal distribution (sigma=0.5)')
plt.xlabel('x')
plt.ylabel('lognormal(x) density')
plt.legend()
plt.show()
```



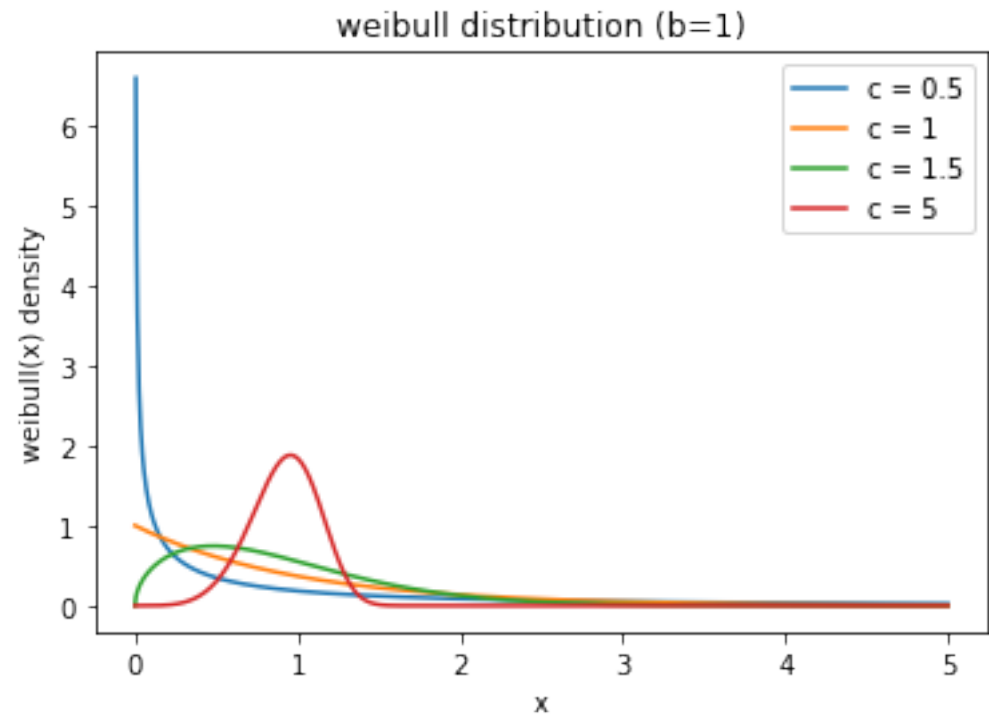
plot weibull distribution

```
In [9]: Wei11 = weibull(0.5,1)
Wei12 = weibull(1,1)
Wei13 = weibull(1.5,1)
Wei14 = weibull(5,1)

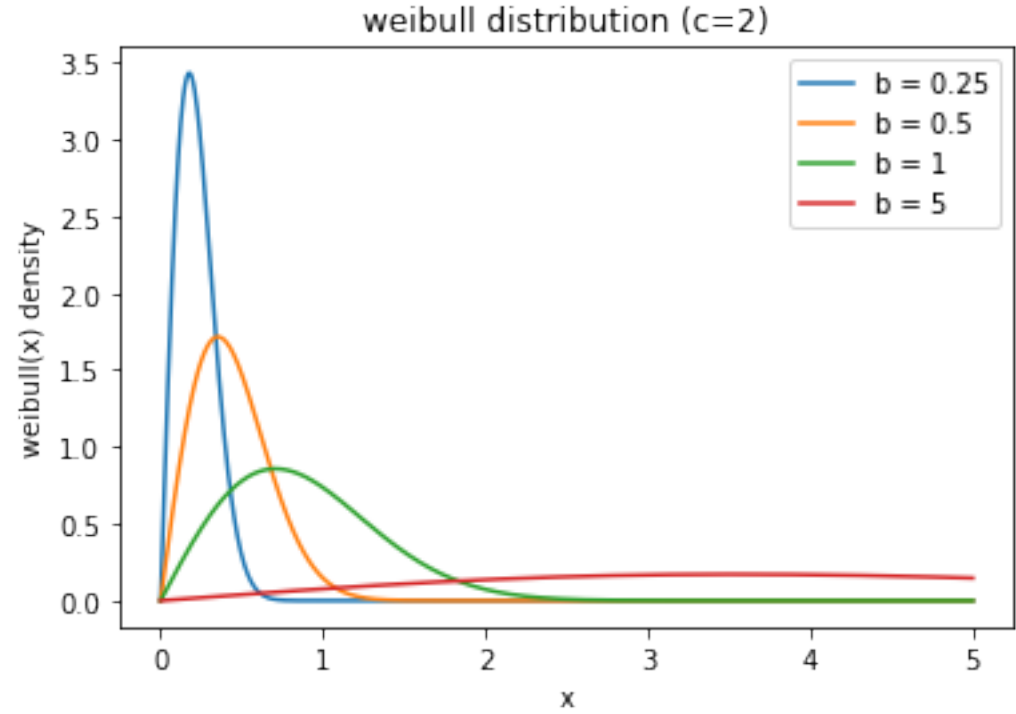
Wei21 = weibull(2,0.25)
Wei22 = weibull(2,0.5)
Wei23 = weibull(2,1)
Wei24 = weibull(2,5)

/Users/Chokeunhee/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: RuntimeWarning: divide by zero encountered in power
```

```
In [10]: plt.figure(3)
plt.plot(x2,Wei11,label=r'c = 0.5')
plt.plot(x2,Wei12,label=r'c = 1')
plt.plot(x2,Wei13,label=r'c = 1.5')
plt.plot(x2,Wei14,label=r'c = 5')
plt.title('weibull distribution (b=1)')
plt.xlabel('x')
plt.ylabel('weibull(x) density')
plt.legend()
plt.show()
```



```
In [11]: plt.figure(4)
plt.plot(x2,Wei21,label=r'b = 0.25')
plt.plot(x2,Wei22,label=r'b = 0.5')
plt.plot(x2,Wei23,label=r'b = 1')
plt.plot(x2,Wei24,label=r'b = 5')
plt.title('weibull distribution (c=2)')
plt.xlabel('x')
plt.ylabel('weibull(x) density')
plt.legend()
plt.show()
```



plot wald distribution

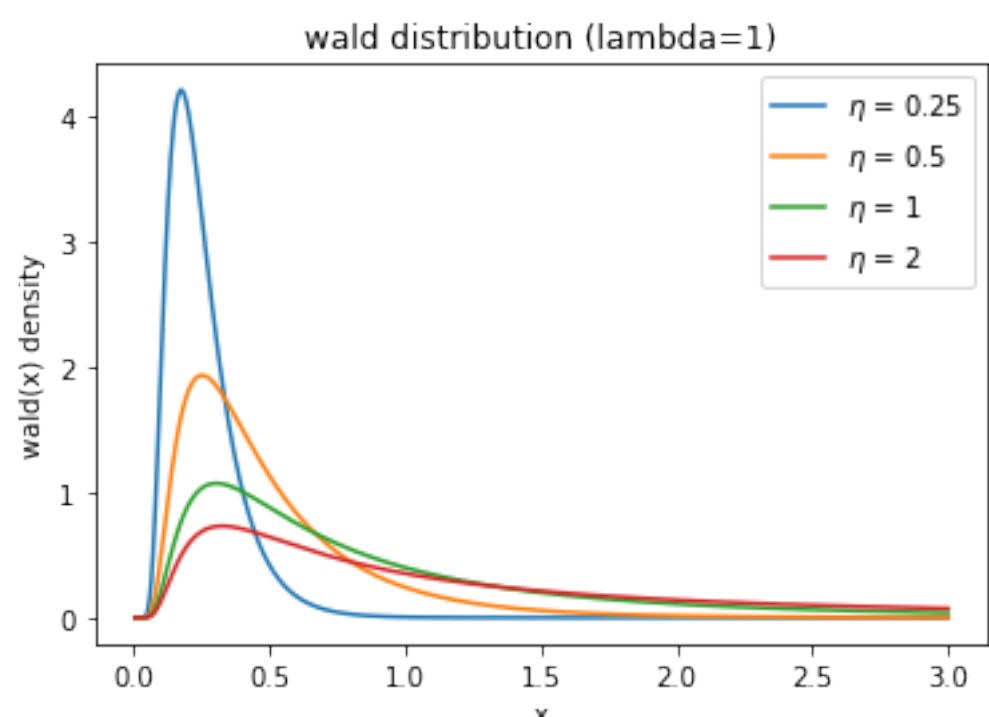
```
In [12]: Wal11 = wald(0.25,1)
Wal12 = wald(0.5,1)
Wal13 = wald(1,1)
Wal14 = wald(2,1)

Wal21 = wald(1,0.25)
Wal22 = wald(1,0.5)
Wal23 = wald(1,1)
Wal24 = wald(1,5)

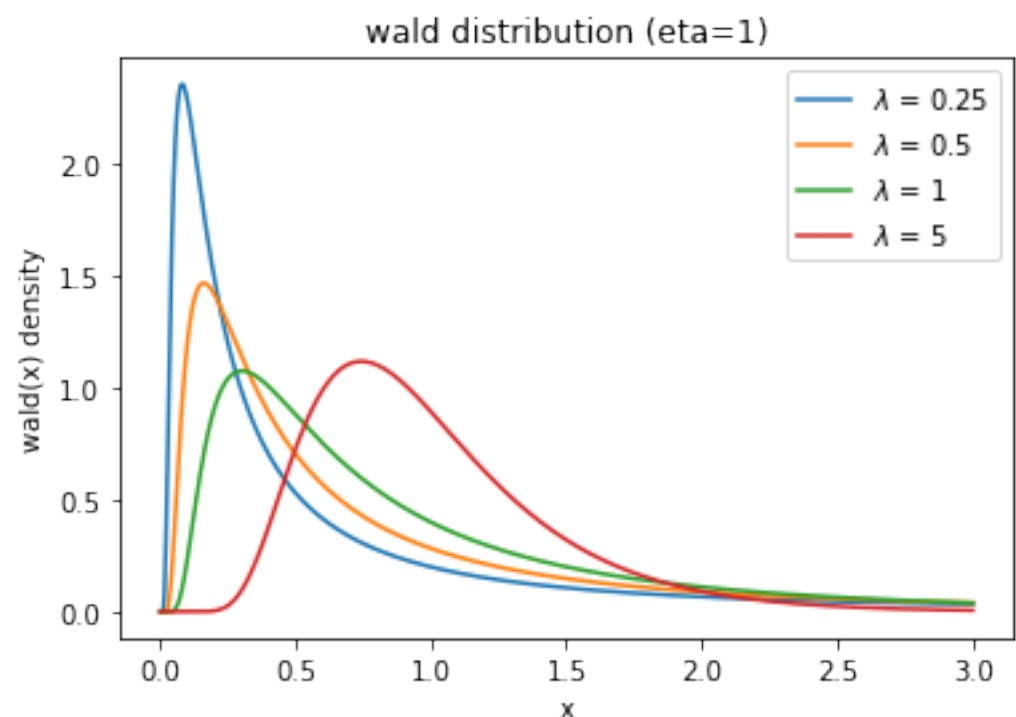
/Users/Chokeunhee/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: RuntimeWarning: divide by zero encountered in true_divide

/Users/Chokeunhee/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: RuntimeWarning: invalid value encountered in multiply
```

```
In [13]: plt.figure(5)
plt.plot(x3,Wal11,label=r'$\eta$ = 0.25')
plt.plot(x3,Wal12,label=r'$\eta$ = 0.5')
plt.plot(x3,Wal13,label=r'$\eta$ = 1')
plt.plot(x3,Wal14,label=r'$\eta$ = 2')
plt.title('wald distribution (lambda=1)')
plt.xlabel('x')
plt.ylabel('wald(x) density')
plt.legend()
plt.show()
```



```
In [14]: plt.figure(5)
plt.plot(x3,Wal21,label=r'$\lambda$ = 0.25')
plt.plot(x3,Wal22,label=r'$\lambda$ = 0.5')
plt.plot(x3,Wal23,label=r'$\lambda$ = 1')
plt.plot(x3,Wal24,label=r'$\lambda$ = 5')
plt.title('wald distribution (eta=1)')
plt.xlabel('x')
plt.ylabel('wald(x) density')
plt.legend()
plt.show()
```



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