

Exercise 8.9

$$f(x) = \frac{1}{175 - 110}$$

a.

$$P(X > 150) = \int_{150}^{175} \frac{1}{175 - 110} \, dx = \frac{25}{175 - 110} = \frac{25}{65} = 0.3846$$

b.

$$P(120 < X < 160) = \int_{120}^{160} \frac{1}{175 - 110} \, dx = \frac{40}{175 - 110} = \frac{40}{65} = 0.6154$$

Exercise 8.13

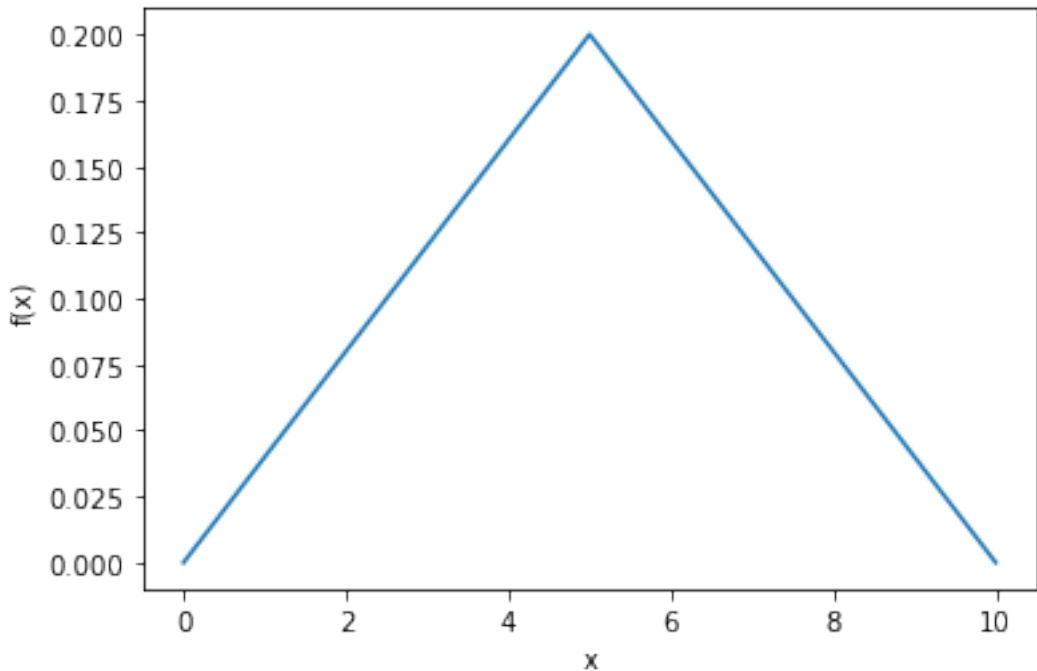
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In [1]: import matplotlib.pyplot as plt

x = [0,5,10]
y = [0,1/5,0]

plt.plot(x, y)

plt.xlabel('x')
plt.ylabel('f(x)')

plt.show()
```



b.

$$P(1 < X < 3) = \int_1^3 \frac{x}{25} \, dx = 0.18 - 0.02 = 0.16$$

c.

$$P(4 < X < 8) = P(4 < X < 5) + P(5 < X < 8) = \int_4^5 \frac{x}{25} \, dx + \int_5^8 \frac{10 - x}{25} \, dx = 0.18 + 0.42 = 0.6$$

d.

$$P(X < 7) = 1 - P(X > 7) = 1 - \int_7^{10} \frac{10 - x}{25} \, dx = 1 - 0.18 = 0.82$$

e.

$$P(X > 3) = 1 - P(X < 3) = 1 - \int_0^3 \frac{x}{25} \, dx = 1 - 0.18 = 0.82$$

Exercise 8.47

```
In [2]: import pandas as pd
import numpy as np
import scipy.stats as stats

mu = 25000
s = 5000
nd = stats.norm(mu, s)

xa = 30000
print("a. p(mu =", mu, ", s =", s, ", x>=", xa, ")=", nd.sf(xa))

xb = 22500
print("b. p(mu =", mu, ", s =", s, ", x<=", xb, ")=", nd.cdf(xb))

xc1, xc2 = 20000, 32000
print("c. p(mu =", mu, ", s =", s, ", ", xc1, "<=x<=", xc2, ")=", nd.cdf(xc2)-nd.cdf(xc1))
```

a. p(mu = 25000 , s = 5000 , x>= 30000)= 0.15865525393145707
b. p(mu = 25000 , s = 5000 , x<= 22500)= 0.3085375387259869
c. p(mu = 25000 , s = 5000 , 20000 <=x<= 32000)= 0.7605880868347719

Exercise 8.57

```
In [3]: mu = 11500
s = 800
nd = stats.norm(mu, s)

xa = 12000
print("a. p(mu =", mu, ", s =", s, ", x>=", xa, ")=", nd.sf(xa))

xb = 10000
print("b. p(mu =", mu, ", s =", s, ", x<=", xb, ")=", nd.cdf(xb))
```

a. p(mu = 11500 , s = 800 , x>= 12000)= 0.26598552904870054
b. p(mu = 11500 , s = 800 , x<= 10000)= 0.03039636176526137

Exercise 8.63

```
In [4]: mu = 7.5
s = 1.2
nd = stats.norm(mu, s)

xa = 4
print("a. p(mu =", mu, ", s =", s, ", x<=", xa, ")=", nd.cdf(xa))

xb1, xb2 = 7, 10
print("b. p(mu =", mu, ", s =", s, ", ", xb1, "<=x<=", xb2, ")=", nd.cdf(xb2)-nd.cdf(xb1))
```

a. p(mu = 7.5 , s = 1.2 , x<= 4)= 0.0017689682391110488
b. p(mu = 7.5 , s = 1.2 , 7 <=x<= 10)= 0.6429284552994241

Exercise 8.83

```
In [5]: λ = 6/60 #hour->minute
mu = 1/λ
expd = stats.expon(scale = mu)

x = 15
print("p(mu =", mu, ", x >=", x, ")=", 1 - expd.cdf(x))

p(mu = 10.0 , x >= 15 )= 0.2231301601484298
```

Exercise 8.87

```
In [6]: mu = 2.7
expd = stats.expon(scale = mu)

x = 3
print("p(mu =", mu, ", x <=", x, ")=", expd.cdf(x))

p(mu = 2.7 , x <= 3 )= 0.6708070121920944
```