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Laboratoria 2 – Zadania

Zadanie 3

Wartości zostały obliczone wcześniej wzorami następującymi:

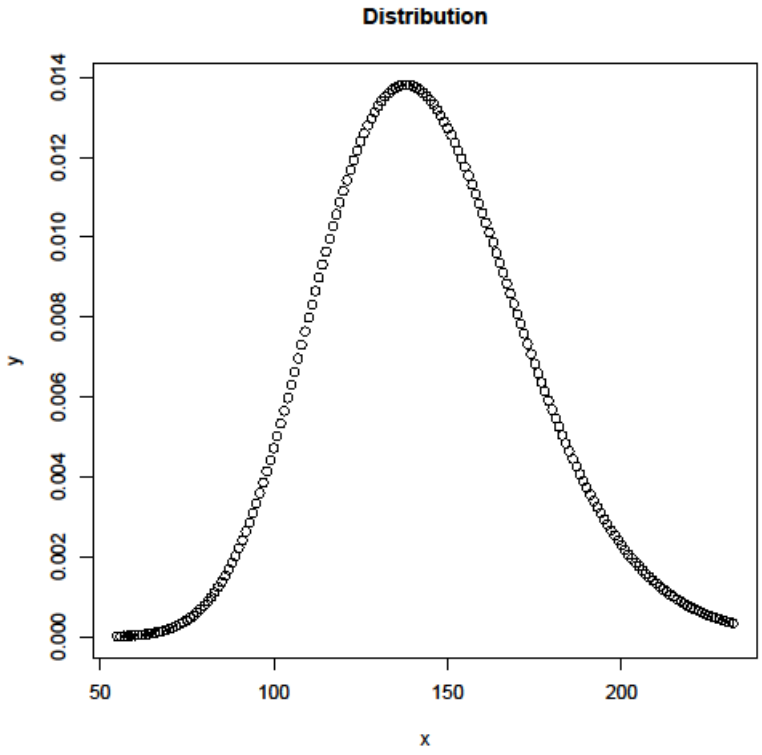
- α = 24
- β = 1/6
- p1 = 1 - pgamma(144,24,scale = 6)
- p2 = pgamma(105,24,scale = 6) = 0.08072202
- qwart1 = qgamma(0.25,24,scale = 6)
- qwart2 = qgamma(0.5,24,scale = 6)
- qwart3 = qgamma(0.75,24,scale = 6)
- EX100 = 100*p2
- procentMyszek = E(Y)/n*100% = p2 * 100%
- 105 – liczba tygodni w 2 lata
- Y = binom(x|100,0.08)
- pwar = P(X>144 i X>52)/P(X>52) = P(X>144)/P(X>52) = p1/(1 - pgamma(52,24,scale = 6))
- E(Z) = E(X - 52) = E(X) - 52

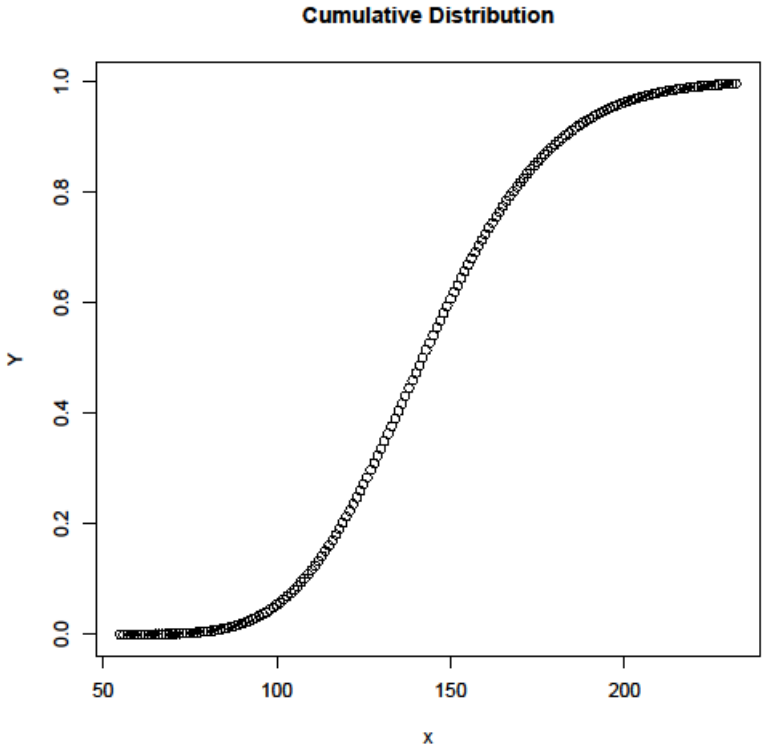
```
load("lab2zad3.RData")
print("P(X>144)")
print(p1)
print("Kwartyle")
print(c(qwart1,qwart2,qwart3))
pdf(file = "Distribution.pdf")
plot(x,y)
title(main = "Distribution")
pdf(file = "Cumulative Distribution.pdf")
plot(x,Y)
title(main = "Cumulative Distribution")
print("Procent myszek traci zdatność w 2 lata")
print(procentMyszek)
print("Najprawdopodobna ze 100 myszek w 2 lata")
print(EX100)
print("P(X>144|X>52)")
print(pwar)
print("Oczekiwana pod warunkiem że X>52")
print(Z)
print(EZ)
```

Wynik tego kodu w R jest następujący:

```
[1] "P(X>144)"
[1] 0.4728497
[1] "Kwartyle"
[1] 123.2383 142.0050 162.5891
[1] "Procent myszek traci zdatność w 2 lata"
[1] 8.072202
[1] "Najprawdopodobna ze 100 myszek w 2 lata"
[1] 9
[1] "P(X>144|X>52)"
[1] 0.4728561
[1] "Oczekiwana pod warunkiem że X>52"
[1] "X - 52"
[1] 92
```

Wykresy są następujące:

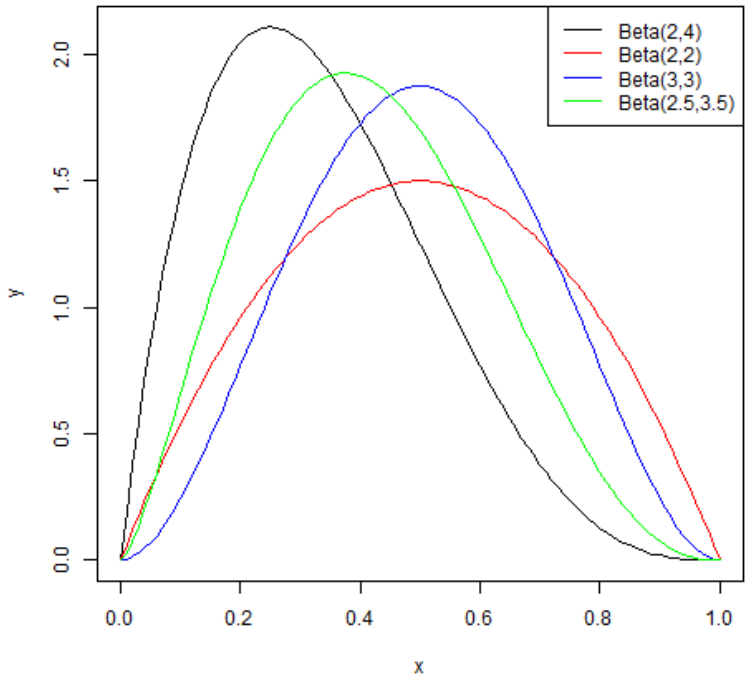



Cumulative Distribution
Y
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
200
x

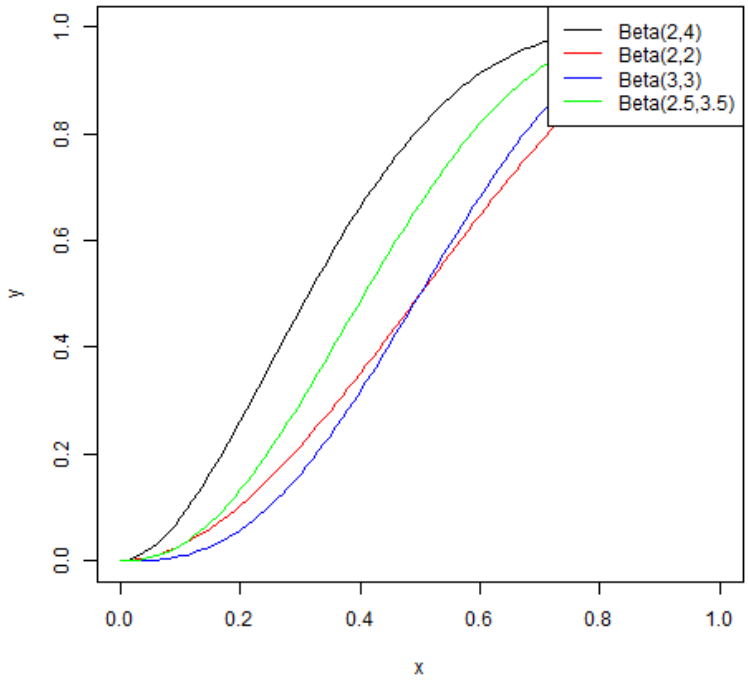
Zadanie 2.21

```
load("zad2_21.RData")

x = seq(0,1,by = 0.01)

y1 = dbeta(x,2,4)
y2 = dbeta(x,2,2)
y3 = dbeta(x,3,3)
y4 = dbeta(x,2.5,3.5)

png(file = "zad2_21_fx.png")
plot(x,y1,type = "l",xlab = "x", ylab = "y")
lines(x,y2,col = "red")
lines(x,y3, col = "blue")
lines(x,y4,col = "green")
legend(x = "topright", legend = c(X1,X2,X3,X4),col =
c("black","red","blue","green"),lty = 1)
dev.off()

Y1 = pbeta(x,2,4)
Y2 = pbeta(x,2,2)
Y3 = pbeta(x,3,3)
Y4 = pbeta(x,2.5,3.5)

png(file = "zad2_21_F.png")
plot(x,Y1,type = "l",xlab = "x", ylab = "y")
lines(x,Y2,col = "red")
lines(x,Y3, col = "blue")
lines(x,Y4,col = "green")
legend(x = "topright", legend = c(X1,X2,X3,X4),col =
c("black","red","blue","green"),lty = 1)
dev.off()
```

Wynik programu to wykresy.
Funkcji gęstości:



Dystrybuanty:



Zadanie 2.22

```
x = pbeta(0.2,2,4)
print(x)
```

Wynik tego programu to następujący:

```
[1] 0.26272
```

Zadanie 2.23

```
x = dbinom(2:5,5,0.2)
p = sum(x)
print(p)
```

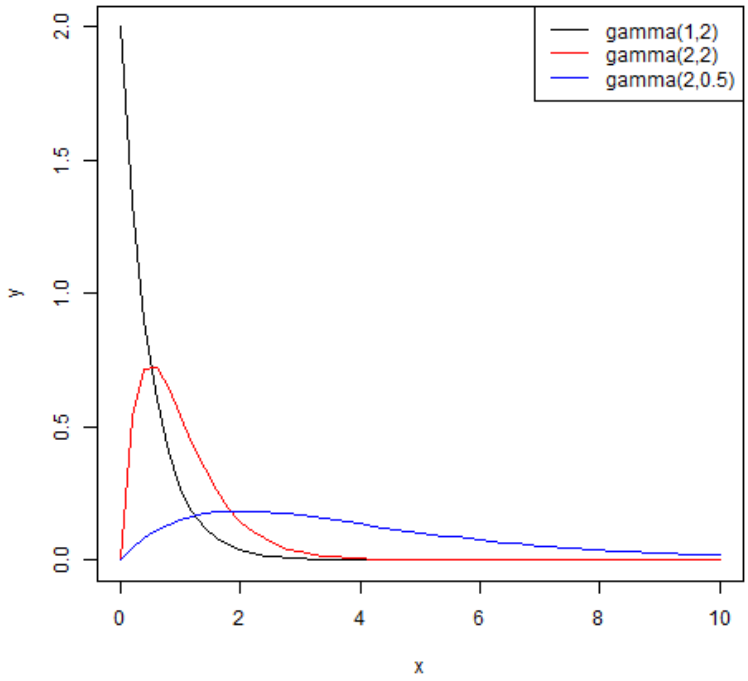
Wynik tego programu to następujący:

```
[1] 0.26272
```

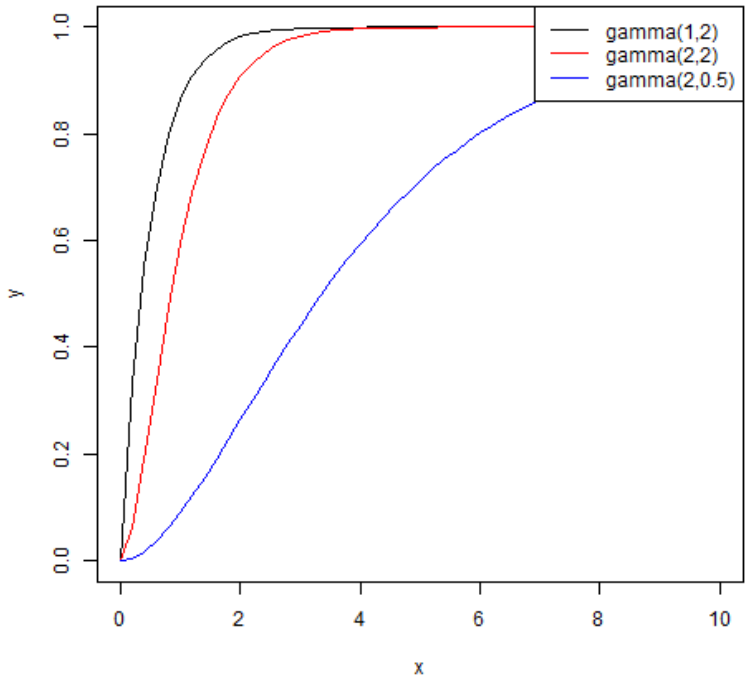
Zadanie 2.24

```
x = seq(0,10, by = 0.2)
X1 = "gamma(1,2)"
X2 = "gamma(2,2)"
X3 = "gamma(2,0.5)"

y1 = dgamma(x,1,rate=2)
y2 = dgamma(x,2,rate=2)
y3 = dgamma(x,2,scale = 2)

png(file = "zad2_24_fx.png")
plot(x,y1,type = "l",xlab = "x", ylab = "y")
lines(x,y2,col = "red")
lines(x,y3, col = "blue")
legend(x = "topright", legend = c(X1,X2,X3),col =
c("black","red","blue"),lty = 1)
dev.off()

Y1 = pgamma(x,1,rate=2)
Y2 = pgamma(x,2,rate=2)
Y3 = pgamma(x,2,scale = 2)

png(file = "zad2_24_f.png")
plot(x,Y1,type = "l",xlab = "x", ylab = "y")
lines(x,Y2,col = "red")
lines(x,Y3, col = "blue")
legend(x = "topright", legend = c(X1,X2,X3),col =
c("black","red","blue"),lty = 1)
dev.off()
```

Wynik tego programu to wykresy.
Funkcji gęstości:



Dystrybuanty:



Zadanie 2.25

```
alpha = 1
beta = 1/24
sigma = 24
p = 1 - pgamma(60,alpha,scale=sigma)
print(p)
```

Wynik tego programu jest następujący:

```
[1] 0.082085
```

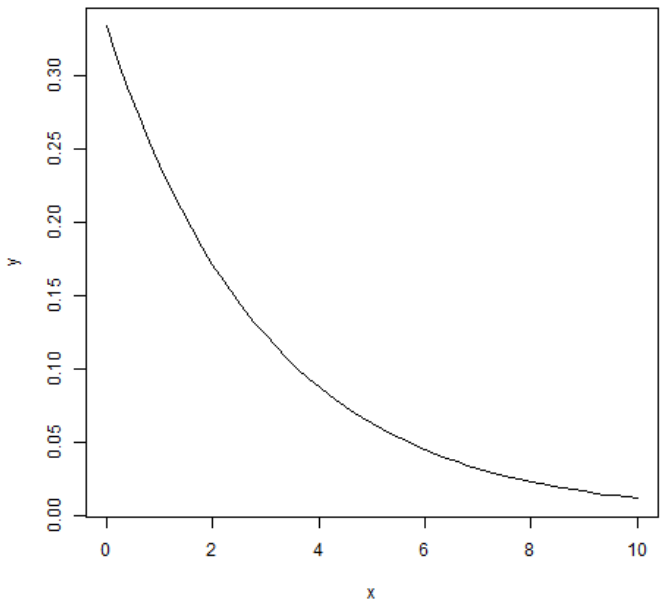
Zadanie 2.26

```
f = function(t) {
      f = 1 - exp(-t/3)
}
d = function(t) {
      d = exp(-t/3)/3
}
p = f(2)-f(1)
cat("P(1<T<2) = ",p)
x = seq(0,10, by = 0.2)
y = d(x)
png(file = "zad2_26.png")
plot(x,y,type = "l")
dev.off()
```

Wynik tego programu jest następujący:

```
P(1<T<2) =  0.2031142
```

I wykres:



Zadanie2.27

```
library(pracma)

X = "ERL(2,1)"
X1 = "ELR(2,5)"

erl = function(x,a,b) {
      erl = b^a*x^(a-1)/gamma(a)*exp(-b*x)
}

x = seq(0,10,by = 0.1)
y = erl(x,2,1)
y1 = erl(x,2,5)

Y <- function(x) erl(x,2,1) #x/gamma(2)*exp(-x)
Y1 <- function(x) erl(x,2,5) #5^2*x^(1)/gamma(2)*exp(-5*x)

png(file = "zad2_27_f1.png")
plot(x,y1,type = "l", xlab = "x", ylab = "y")
lines(x,y, col ="green")
dev.off()

p = integral(Y,1,2, method = "Kron")
p1 = integral(Y1,1,2, method = "Kron")
cat(X," P(1<X<2) = ",p,"\n")
cat(X1," P(1<X<2) = ",p1,"\n")
```

Wynik tego programu jest następujący:

```
ERL(2,1)  P(1<X<2) =  0.329753
ELR(2,5)  P(1<X<2) =  0.03992828
```

Wraz z wykresem: