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### exo 1
# Tester les commandes suivantes
x = 1:10; cumsum(x)
y = matrix(1:10, nrow = 2, ncol = 5)
apply(y, 1, sum); apply(y, 2, sum)
apply(y, 1, mean); apply(y, 2, mean)
z = rnorm(100);
hist(z, br = 50); lines(x, dnorm(x), col =
"red")
hist(z, probability = T);
x = seq(-3,3,0.01); lines(x, dnorm(x), col
= "red")
### exo 2
# a) densite de loi normale
x = seq(-3, 3, 0.01)
y = dnorm(x); y1 = dnorm(x, 0, 0.5); y2 =
dnorm(x, 1, 1)
plot(x, y, type = "l", ylim = c(0,1))
lines(x, y1, col = "red")
lines(x, y2, col = "green")
legend("topleft",
       legend = c("N(0, 1)", "N(0, 0.5)",
"N(1, 1)"),
       col = c("black", "red", "green"),
lty = 1)
# b) densite de loi exponentielle
hist(rexp(100, 0.5))
x = seq(0,10,0.01)
y1 = dexp(x, 0.5); y2 = dexp(x, 1); y3 =
dexp(x, 3)
plot(x, y1, type = 'l', col = 1)
lines(x, y2, type = 'l', col = 2)
lines(x, y3, type = 'l', col = 3)
legend("topright", c("E(0.5)","E(1)",
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  "E(3)"),col = 1:3,
       lty = 1)
# c) dans trois graphes differents
par(mfrow = c(1,3))
plot(x, y1, type = 'l', col = 1)
legend("topright", c("E(0.5)"),col = 1,
       lty = 1)
plot(x, y2, type = 'l', col = 2)
legend("topright", c("E(1)"),col = 2,
       lty = 1)
plot(x, y3, type = 'l', col = 3)
legend("topright", c("E(3)"),col = 3,
       lty = 1)
### exo 3
dpareto <- function(x, p){p/(x^(p+1))};
ppareto <- function(x, p){1-1/(x^p)}
qpareto <- function(y, p){(1/(1-y))^(1/p)}

### exo 4
# a) Les densite de loi Pareto ...
n = 1000
x = seq(1, 10, length.out = n)
p = c(1/2, 1, 2, 3, 5)
y = matrix(0, nrow = 5, ncol = n)
for(i in 1:5){
  y[i,] = dpareto(x, p[i])
}
plot(x, y[1,], type = "l", lty = 1)
for(i in 2:5){
  lines(x, y[i,], lty = i)
}
legend("topright", lty = 1:5,
as.character(p))
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# b) Les courbes (logx, log(1-F(x)))
f = matrix(0, nrow = 5, ncol = n)
for(i in 1:5){
  f[i,] = 1-ppareto(x, p[i])
}
plot(log(x), log(f[1,]), type = "l", lty =
1)
for(i in 2:5){
  lines(log(x), log(f[i,]), lty = i)
}
legend("topright", lty = 1:5,
as.character(p))

# c) Simulation de 1000 v.a. ...
n = 1000;
z = matrix(0, nrow = 5, ncol = n)
for(i in 1:5){
  z[i,] = rpareto(n, p[i])
}
par(mfrow = c(2,3))
for(i in 1:5){
  hist(z[i,][z[i,] <= 10], freq = F, main =
as.character(p[i]));
  lines(x, y[i,], lty = i)
}
```