

Homework-1 - Code/Plots for Problem 2

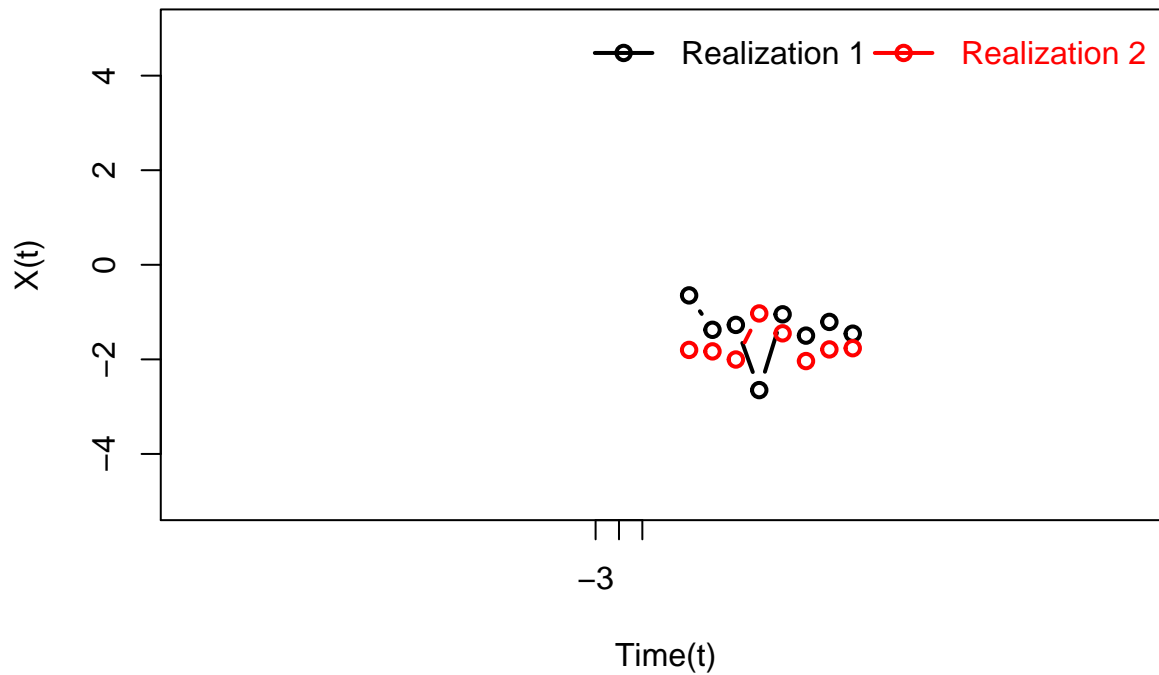
Aji John

Realizations for 2(a)

```
a=-2
b=1
sigmasquare = 1
c = pi/4
p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)
p21 <- function(rn,index) a+(b*rn[index]) + (c*rn[index-2])
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))
for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",
xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations - Problem 2(a)")
axis(1,at=round(min(p2ares1)):max(p2ares1))
lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
legend("topright",legend=c("Realization 1","Realization 2"),
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=1,
text.col=c("black","red"),
inset=0.01)
```

Indepenndent Realizations – Problem 2(a)



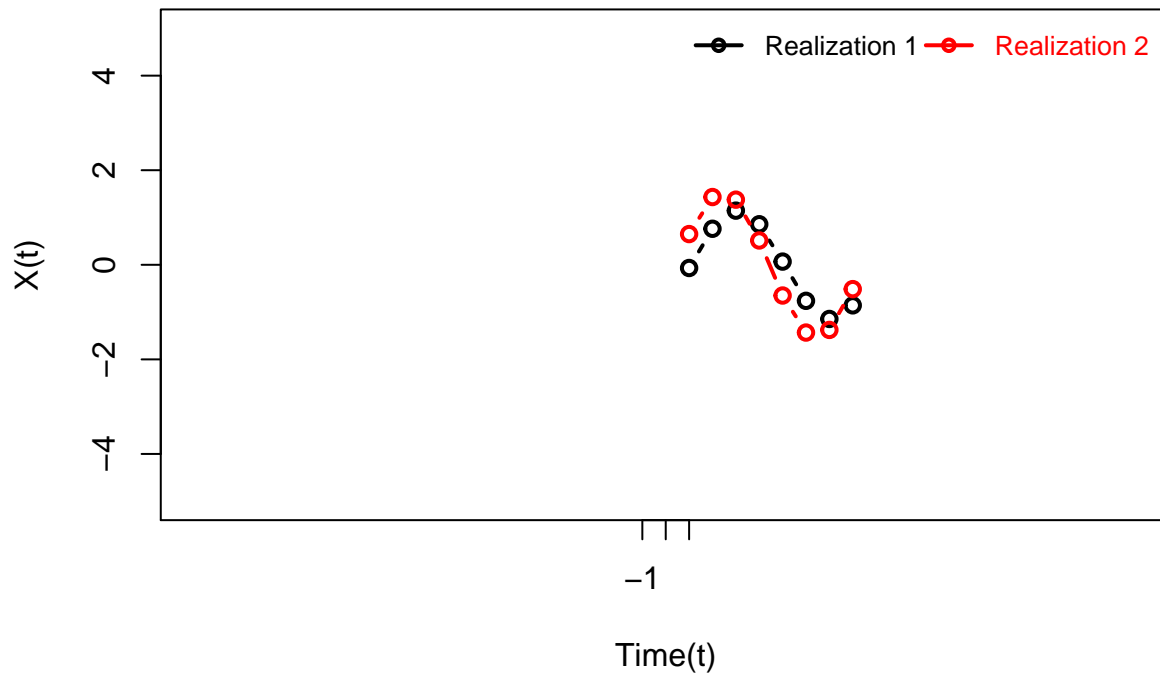
Realizations for 2(b)

```
p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)
p21 <- function(rn,index) (cos(c*index) * rn[2]) + (sin(c*index)*rn[1])
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))

for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",
xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations - Problem 2(b)")
axis(1,at=round(min(p2ares1)):max(p2ares1))
lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
legend("topright",legend=c("Realization 1","Realization 2"),
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=0.8,
text.col=c("black","red"),
inset=0.01)
```

Indepenndent Realizations – Problem 2(b)



Realizations for 2(a)

```
a=-2
b=1
sigmasquare = 1
c = pi/4
p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)

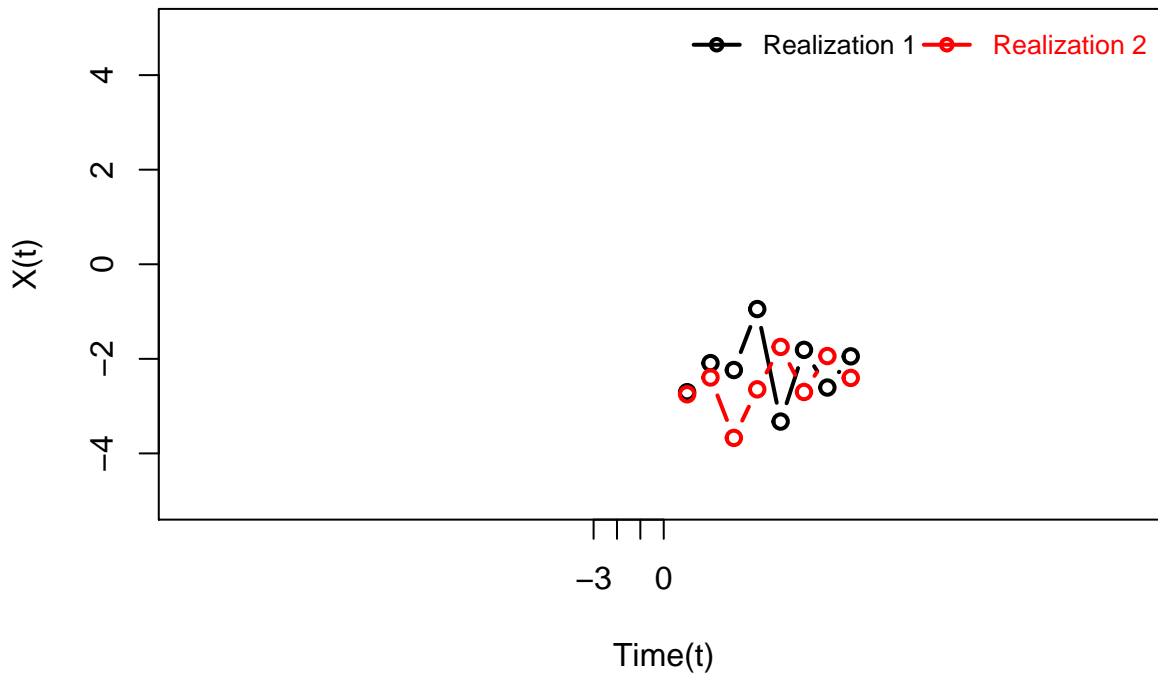
p21 <- function(rn,index) a+(b*rn[index]) + (c*rn[index-2])
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))

for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",
xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations - Problem 2(a)")
axis(1,at=round(min(p2ares1)):max(p2ares1))
lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
legend("topright",legend=c("Realization 1","Realization 2"),
```

```
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=0.8,
text.col=c("black","red"),
inset=0.01)
```

Indepenndent Realizations – Problem 2(a)



Realizations for 2(c)

```
p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)

p21 <- function(rn,index) (cos(c*index) * rn[index]) + (sin(c*index)*rn[index-1])
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))

for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

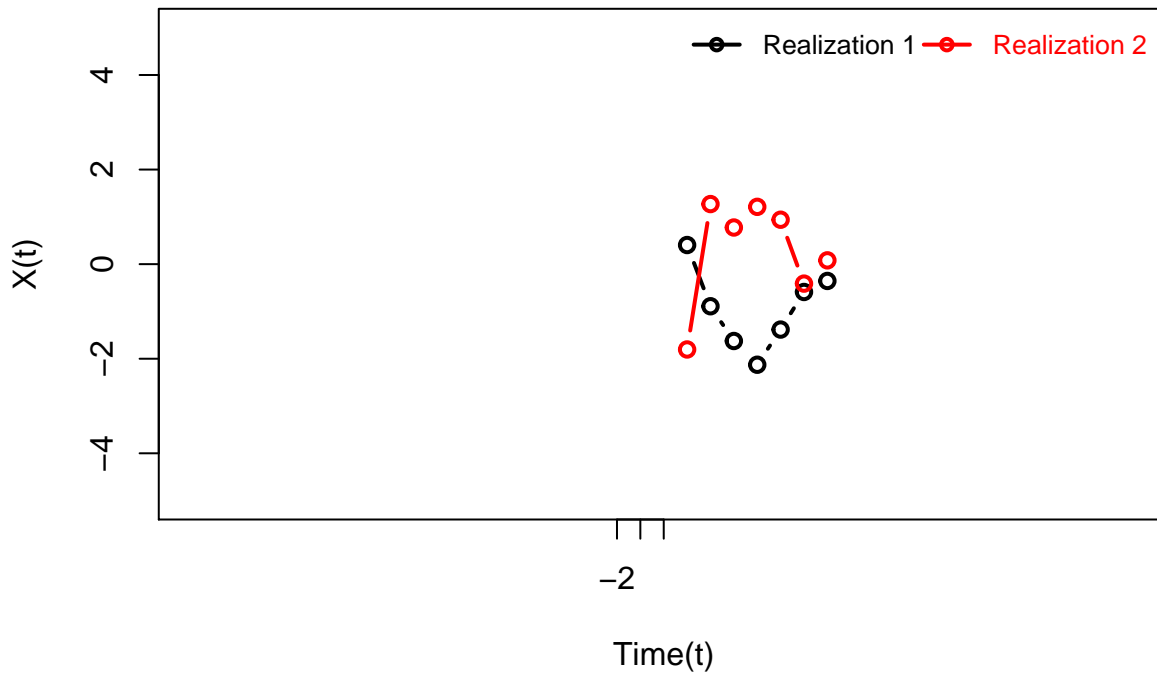
plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",
xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations - Problem 2(c)")
axis(1,at=round(min(p2ares1)):max(p2ares1))
lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
```

```

legend("topright",legend=c("Realization 1","Realization 2"),
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=0.8,
text.col=c("black","red"),
inset=0.01)

```

Indepenndent Realizations – Problem 2(c)



Realizations for 2(d)

```

p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)

p21 <- function(rn,index) a + (b * rn[1])
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))

for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",
xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations - Problem 2(d)")
axis(1,at=round(min(p2ares1)):max(p2ares1))

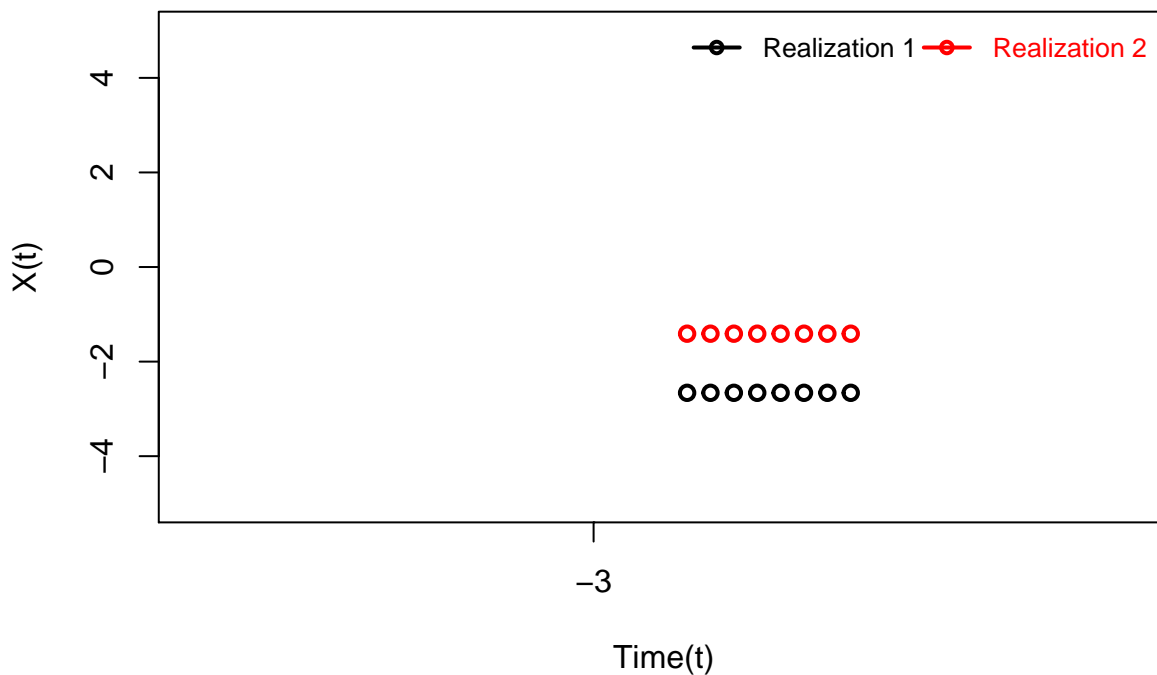
```

```

lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
legend("topright",legend=c("Realization 1","Realization 2"),
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=0.8,
text.col=c("black","red"),
inset=0.01)

```

Indepenndent Realizations – Problem 2(d)



Realizations for 2(e)

```

p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)

p21 <- function(rn,index)  sin(c*index) * rn[1]
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))

for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",
xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations – Problem 2(e)")

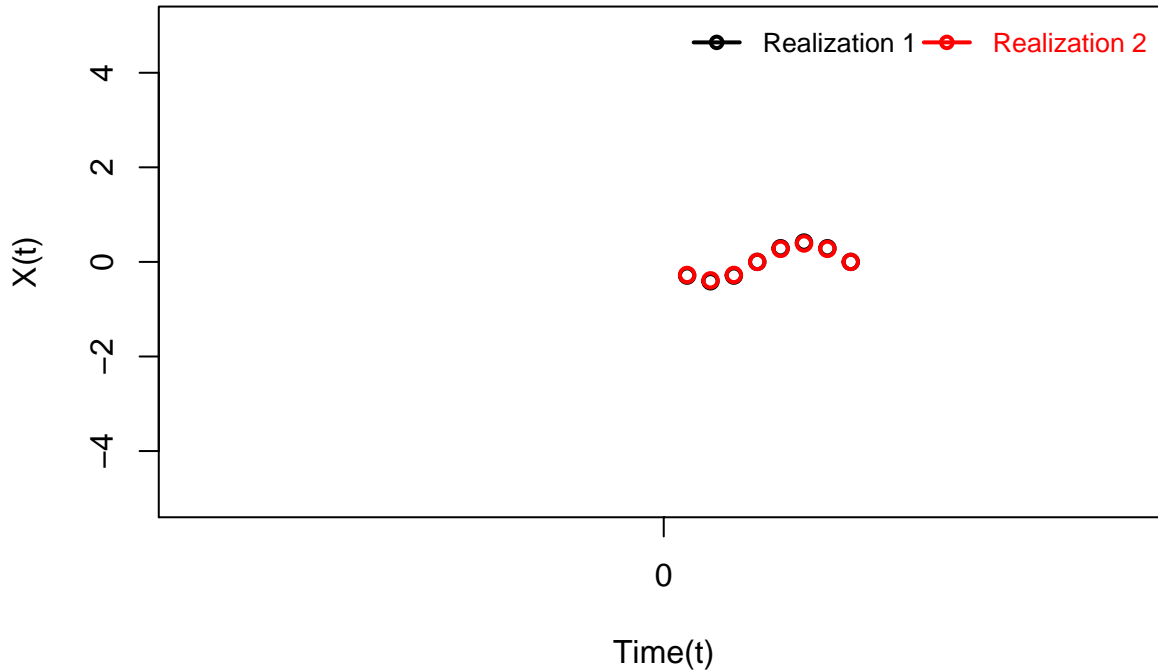
```

```

axis(1,at=round(min(p2ares1)):max(p2ares1))
lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
legend("topright",legend=c("Realization 1","Realization 2"),
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=0.8,
text.col=c("black","red"),
inset=0.01)

```

Indepenndent Realizations – Problem 2(e)



Realizations for 2(f)

```

p2ar1 <- rnorm(8,0,1)
p2ar12 <- rnorm(8,0,1)

p21 <- function(rn,index)  rn[index] * rn[index-1]
p2ares1 <- c()
p2ares2 <- c()
t <- c(1:8)
#create random process
for( i in 1:8)
  p2ares1=c(p2ares1,p21(p2ar1,i))

for( i in 1:8)
  p2ares2=c(p2ares2,p21(p2ar12,i))

plot(t,p2ares1[1:8],type="b",lwd=2,
xaxt="n",ylim=c(-5,5),xlim=c(-20,20),col="black",

```

```

xlab="Time(t)",ylab="X(t)",
main="Indepenndent Realizations - Problem 2(f)"
axis(1,at=round(min(p2ares1)):max(p2ares1))
lines(t,p2ares2[1:8],col="red",type="b",lwd=2)
legend("topright",legend=c("Realization 1","Realization 2"),
lty=1,lwd=2,pch=21,col=c("black","red"),
ncol=2,bty="n",cex=0.8,
text.col=c("black","red"),
inset=0.01)

```

Indepenndent Realizations – Problem 2(f)

