Tutorial 1: Introduction to R Answers Sheet

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3. Commands, Variables and Functions

Task 1

```
x=1
sin(x)^2+cos(x)^2
```

The result of this command is always 1, irrespective of the numerical value of x.

4. Vectors

Task 1

```
x=1:3
y=x^2
rep(y,3)
```

Task 2

```
rep(seq(1,7,3),3)
```

Task 3

```
sum(seq(1,999,2))
```

Answer: 250,000

There are a few ways to do part 2. One way:

```
sum((1:500)*2-1)
```

5. Vector Indexing

Task 1

```
x <- c(7,4,10,3,15,8,1)
y <- c(6,2:4)
x[-y]
```

Task 2

There are a few ways to do this. One way:

```
x=-5:5
x[1:5]=0
x[seq(7,11,2)]=1
```

Task 3

```
x=0:1000
x[seq(1,1001,2)]=0
sum(x)
```

Answer: 250,000

6. Logical Operators and Statements

Task 1

```
x=1:10
x[x<4 | x==5 | x>6]
x[x!=4 & x!=6]
x[!(x==4 | x==6)]
```

Task 2

```
x=-10:10
y=sqrt(x)
z=x[y>2 & !is.na(y)]
```

7. Matrices and Arrays

Task 1

```
x=matrix(0,5,8)
x[2:4,c(3,5,7)]=1
sum(crossprod(x,x))
```

Task 2

```
x=1:24
dim(x)=c(4,6)
dim(x)=c(4,3,2)
dim(x)=c(2,2,3,2)
x=as.vector(x)
```

8. Types, Objects, Classes and Character Strings

Task 1

```
paste("a","b",sep="_")
x <- c("a","b","c")
paste(x,collapse="")
```

9. Reading and Writing Files, and Data Frames

Task 1

```
data(CO2)
CO2
CO2$uptake
x=CO2$uptake[CO2$Type=="Quebec" & CO2$Treatment=="chilled"]
summary(x)
```

10. Plotting and Graphical Facilities

Task 1

```
data(Puromycin)
Puromycin
plot(Puromycin$rate~Puromycin$conc)
plot(Puromycin$rate~Puromycin$conc,xlab="Substrate Concentration",
   ylab="Reaction Rate",main="Reaction Rate vs Substrate Concentration")
plot(Puromycin$rate~Puromycin$conc,xlab="Substrate Concentration",
   ylab="Reaction Rate",main="Reaction Rate vs Substrate Concentration",
   pch=19)
points(Puromycin$rate[Puromycin$state=="treated"->x]~Puromycin$conc[x],
   pch=19,col="red")
```

Task 2

```
x <- rnorm(1000)
hist(x)
hist(x,breaks=100,col="red")
hist(x,breaks=100,freq=FALSE)
lines(density(x),lwd="2")
```