Module 1 Homework

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Question 1

(a)

```
vec <- c(5,TRUE)
class(vec)
```

```
## [1] "numeric"
```

(b)

```
x <- 1:4
y <- 1:2
x+y
```

```
## [1] 2 4 4 6
```

(c)

```
fsin<-function(x) sin(pi*x)
fsin(1)
```

```
## [1] 1.224647e-16
```

So the number 0 is returned.

(d)

```
c(1,2) %*% t(c(1,2))
```

```
##      [,1] [,2]
## [1,]    1    2
## [2,]    2    4
```

So it returns A two by two matrix

(e)

```
f <- function(x) {
  g <- function(y) {
    y+z
  }
  z <- 4
  x + g(x)
}
z <- 15
f(3)
```

```
## [1] 10
```

Question 2

```
fs <- function(x) x^2
sum(fs(1:1000))
```

```
## [1] 333833500
```

Question 3

(a)

```
k <- c(1:20)
X <- 2*k
print(X)
```

```
##  [1]  2  4  6  8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
```

(b)

```
Y <- rep(0,20)
print(Y)
```

```
##  [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

(c)

```
integrand <- function(x) sqrt(x)
for (i in 1:20) {
  if (i < 12) {
    Y[i] = 3*k[i]
  }else {
```

```
    Y[i] = integrate(integrand, lower = 0, upper = k[i])$value
  }
}
print(Y)
```

```
##  [1]  3.00000  6.00000  9.00000 12.00000 15.00000 18.00000 21.00000
##  [8] 24.00000 27.00000 30.00000 33.00000 27.71282 31.24811 34.92214
## [15] 38.72984 42.66667 46.72854 50.91169 55.21273 59.62849
```