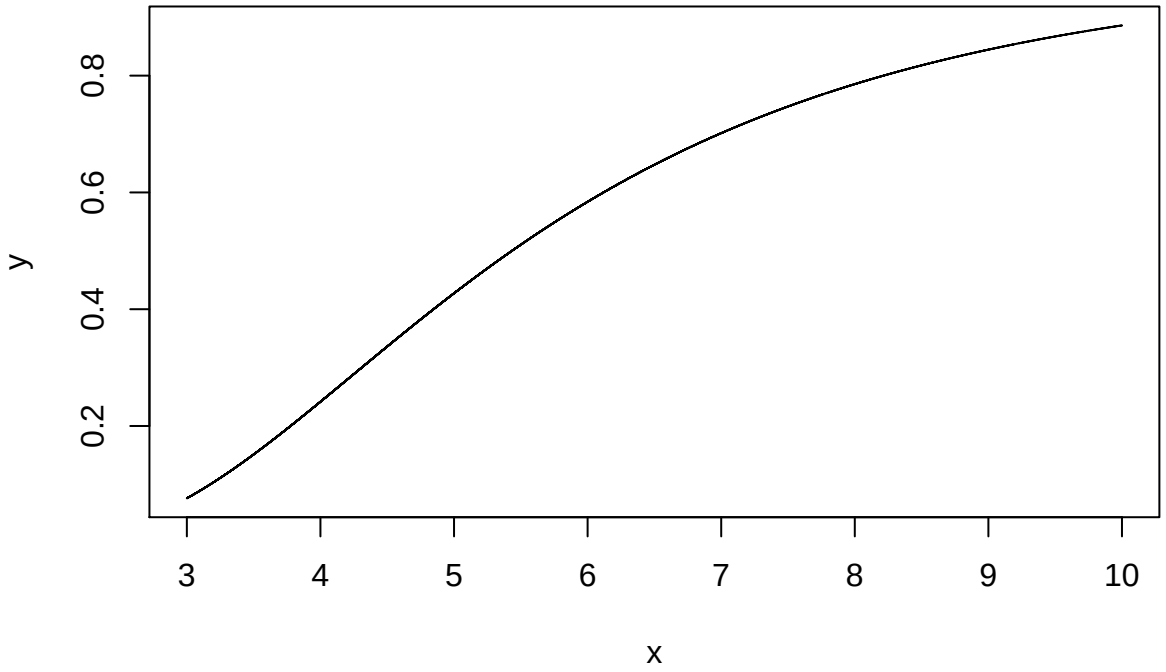
561A3

tom

2018-01-27

2.(a)

```
x <- seq(3,10,0.0001)
y <- pchisq((50.76/x),df=10,lower.tail = FALSE)
plot(x,y,type="l")
```



As theta goes to 10, the power gets larger.

2.(b)

```
##calculate the values
b_3.5 <- pchisq((50.76/3.5),df=10,lower.tail = FALSE)
b_5 <- pchisq((50.76/5),df=10,lower.tail = FALSE)
#simulation

b1 <- sqrt(3.5)
b2 <- sqrt(5)
crtr_1 <- 50.76/3.5
crtr_2 <- 50.76/5
count_3.5 <- rep(NA, 10000)
count_5 <- rep(NA, 10000)
for (i in 1:10000) {
```

```
  x_3.5 <- rnorm(10, mean=1, sd=b1)
  x_5 <- rnorm(10, mean=1, sd=b2)
  t_obs_3.5 <- sum((x_3.5-1)^2)/3.5
  t_obs_5 <- sum((x_5-1)^2)/5
  if (t_obs_3.5>crtr_1) {
    count_3.5[i] <- 1
  }
  else {
    count_3.5[i] <- 0
  }
  if (t_obs_5>crtr_2) {
    count_5[i] <- 1
  }

  else {
    count_5[i] <- 0
  }

}
print("The exact value for beta(3.5)is ")
```

```
## [1] "The exact value for beta(3.5)is "
```

```
b_3.5
```

```
## [1] 0.1512652
```

```
print("The simulated value for beta(3.5)is ")
```

```
## [1] "The simulated value for beta(3.5)is "
```

```
sum(count_3.5)/10000
```

```
## [1] 0.1474
```

```
print("The exact value for beta(5)is ")
```

```
## [1] "The exact value for beta(5)is "
```

```
b_5
```

```
## [1] 0.4272606
```

```
print("The simulated value for beta(3.5)is ")
```

```
## [1] "The simulated value for beta(3.5)is "
```

```
sum(count_5)/10000
```

```
## [1] 0.4343
```

So they are pretty similar.

3

```
pgamma(11.94, shape=10, rate = 1,lower.tail = T, log.p = FALSE)
```

```
## [1] 0.7523267
```

4

```
rr <- (0.05)^(1/40)
count <- rep(NA,10000)
for (i in 1:10000) {
x <- runif(20,0,1)
y <- sqrt(x)
if (max(y)<rr) {
  count[i] <- 1
}
else {
  count[i] <- 0
}
}
sum(count)/10000
```

```
## [1] 0.0493
```

It is pretty close to 0.05