Midterm1_Problem6c_Simulation

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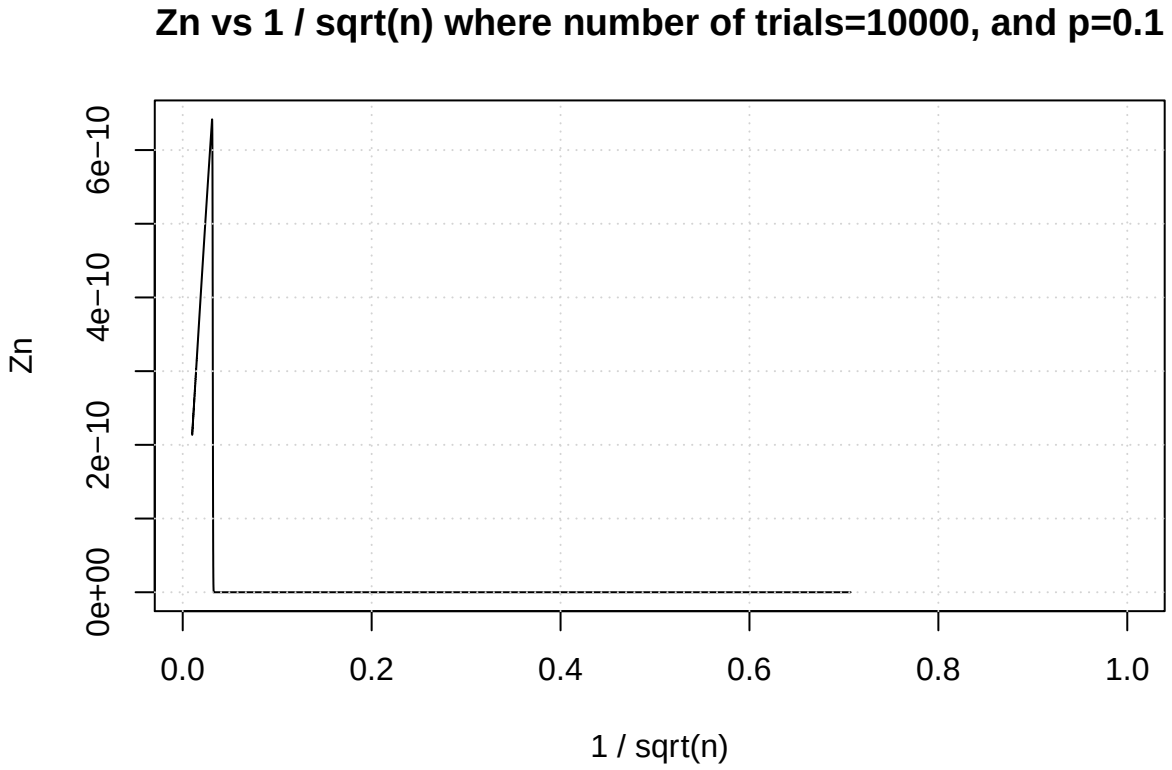
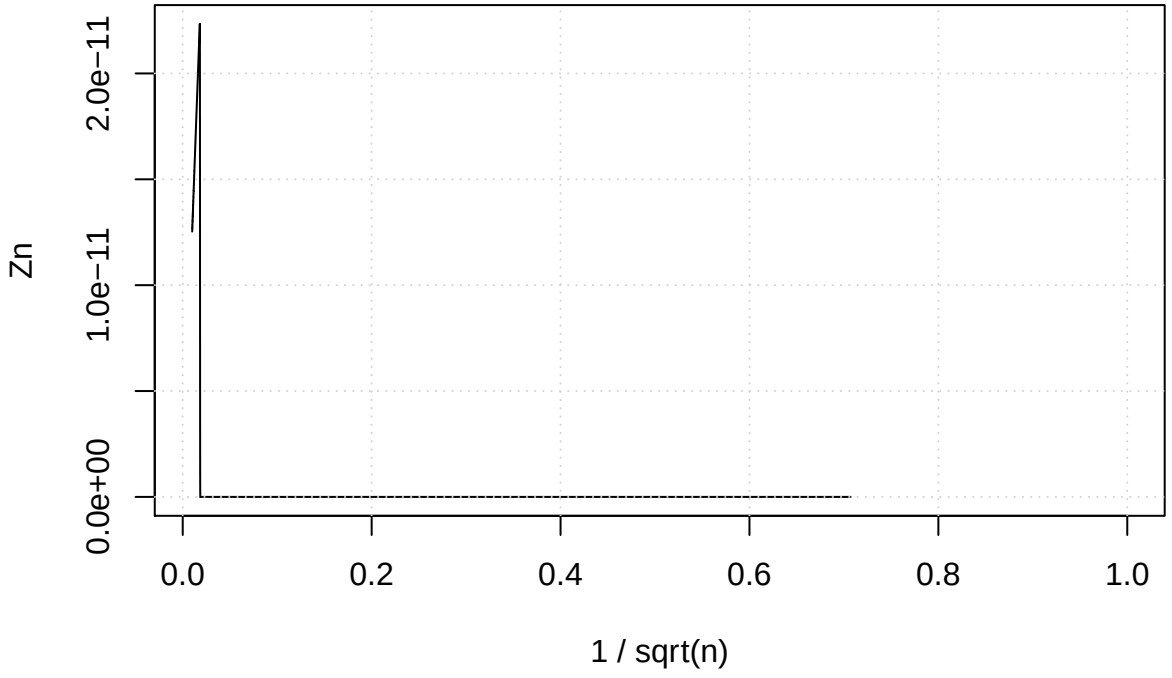
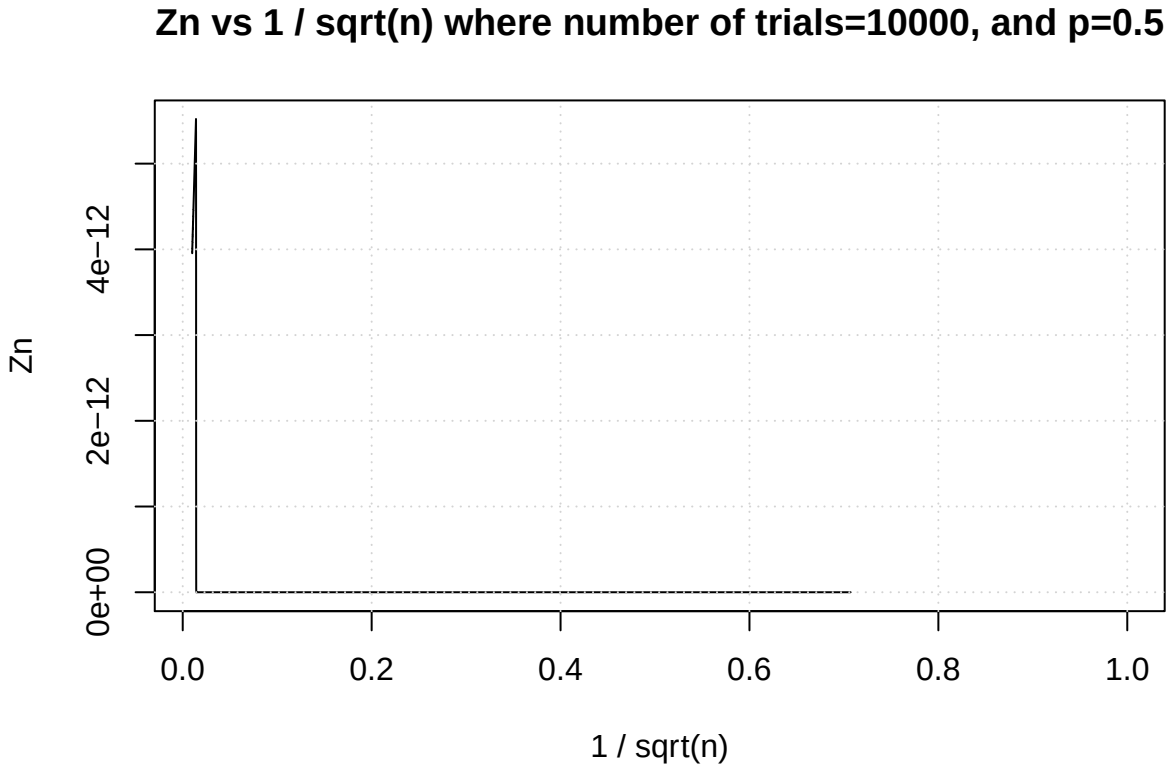
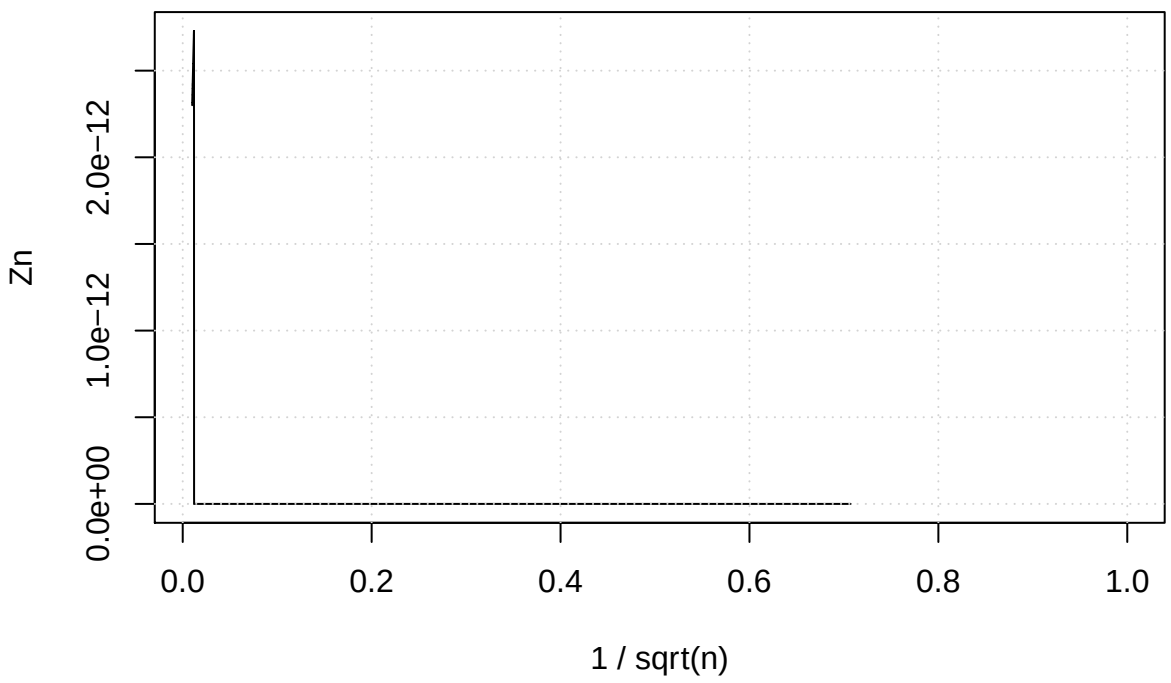
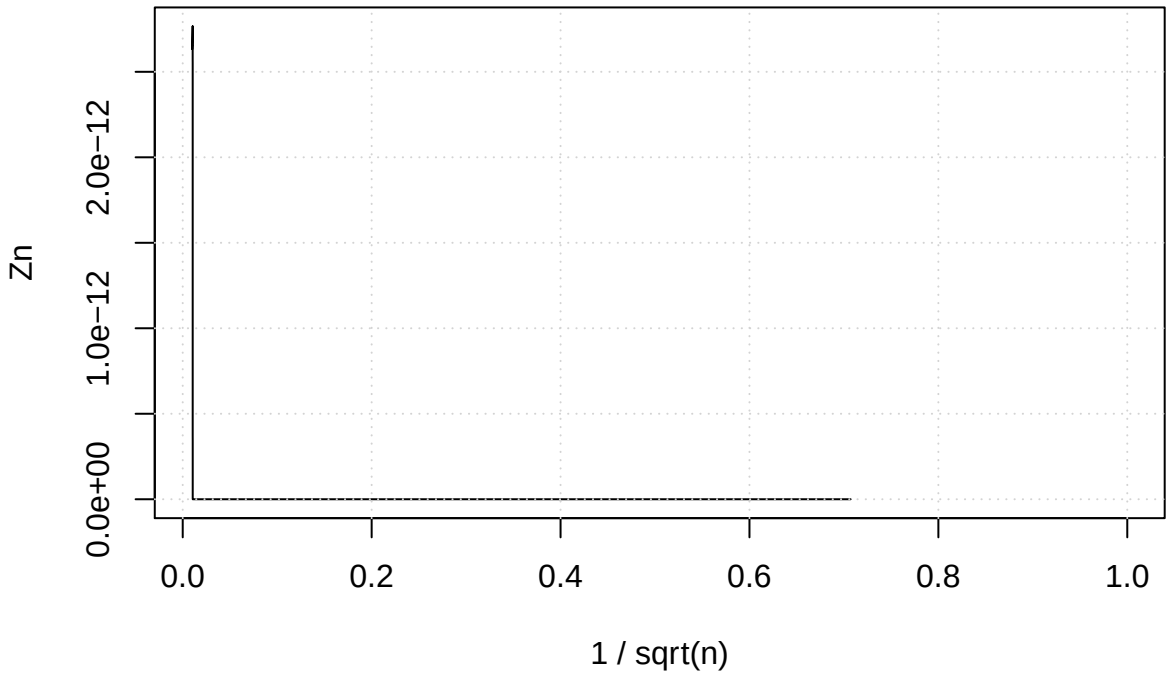
```
n_trials <- 10000
p_vec <- seq(0.1, 1, by = 0.2)
for (p in p_vec) {
  Y <- dbinom(x=1:n_trials, size=n_trials, prob=p)

  Z <- vector(length = n_trials)
  Z.sd <- vector(length = n_trials)
  for (i in 1:n_trials) {
    Z[i] <- cos(2 * pi * Y[i] / i)
    Z.sd[i] <- sd(Z[1:i])
  }


  title <- paste0('Zn vs 1 / sqrt(n) where number of trials=',n_trials,', and p=',p)
  plot(
    1/sqrt(1:n_trials),
    Z.sd,
    type = 'l',
    main=title,
    xlab = '1 / sqrt(n)',
    ylab = 'Zn'
  )

  grid()
}
```


Zn vs 1 / sqrt(n) where number of trials=10000, and p=0.1
Zn
0e+00
2e−10
4e−10
6e−10
0.0
0.2
0.4
0.6
0.8
1.0
1 / sqrt(n)


Zn vs 1 / sqrt(n) where number of trials=10000, and p=0.3
Zn
0.0e+00
1.0e−11
2.0e−11
0.0
0.2
0.4
0.6
0.8
1.0
1 / sqrt(n)


Zn vs 1 / sqrt(n) where number of trials=10000, and p=0.5
Zn
0e+00
2e−12
4e−12
0.0
0.2
0.4
0.6
0.8
1.0
1 / sqrt(n)


Zn vs 1 / sqrt(n) where number of trials=10000, and p=0.7
Zn
0.0e+00
1.0e−12
2.0e−12
0.0
0.2
0.4
0.6
0.8
1.0
1 / sqrt(n)


Zn vs 1 / sqrt(n) where number of trials=10000, and p=0.9
Zn
0.0e+00
1.0e−12
2.0e−12
0.0
0.2
0.4
0.6
0.8
1.0
1 / sqrt(n)