

AmathData

2022-06-01

R Markdown

```
library(mosaic)
library(fastR2)
qqp <- function(x, tit, subtit){
  lambda <- 1/mean(x)
  gf_qq(~x, distribution = qexp, dparams = list(rate = lambda),
        title = tit,
        subtitle = subtit)%>%
  gf_qqline(distribution = qexp, dparams = list(rate = lambda))
}
```

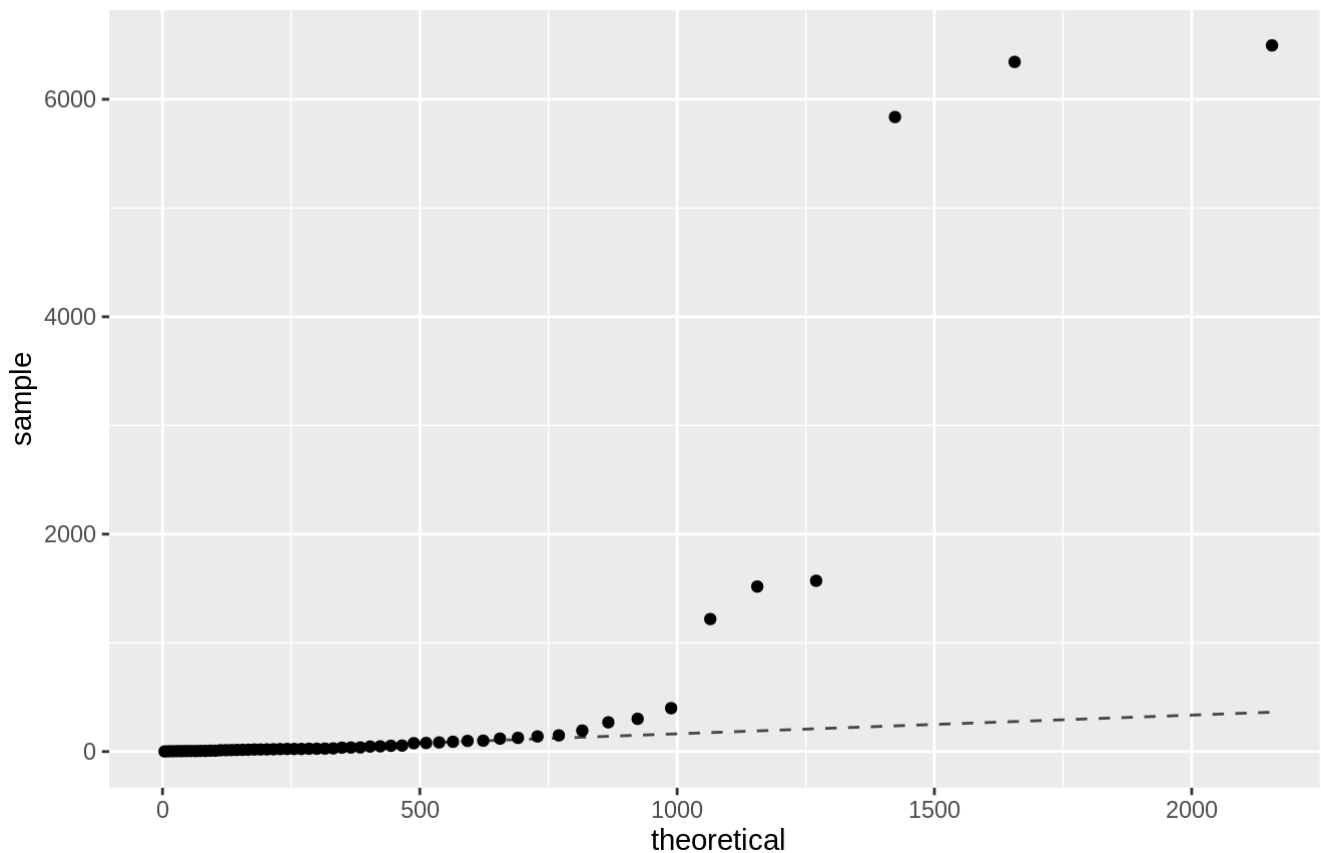
Stochastic Asynchronous Fixed (Second Quantile)

```
t1 <- c(5837, 399, 55, 20, 3, 46, 139, 3, 16, 15, 90, 4, 6, 24, 17, 193, 24, 53, 1518)
t2 <- c(6496, 269, 100, 98, 1, 5, 29, 84, 8, 8, 5, 14, 149, 6, 4, 26, 119, 24, 1571)
t3 <- c(6344, 301, 21, 26, 5, 36, 19, 19, 48, 79, 38, 37, 77, 12, 13, 27, 126, 23, 1219)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)

qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the Second Quantile) including the first infection event")
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the Second Quantile) including the first infection event

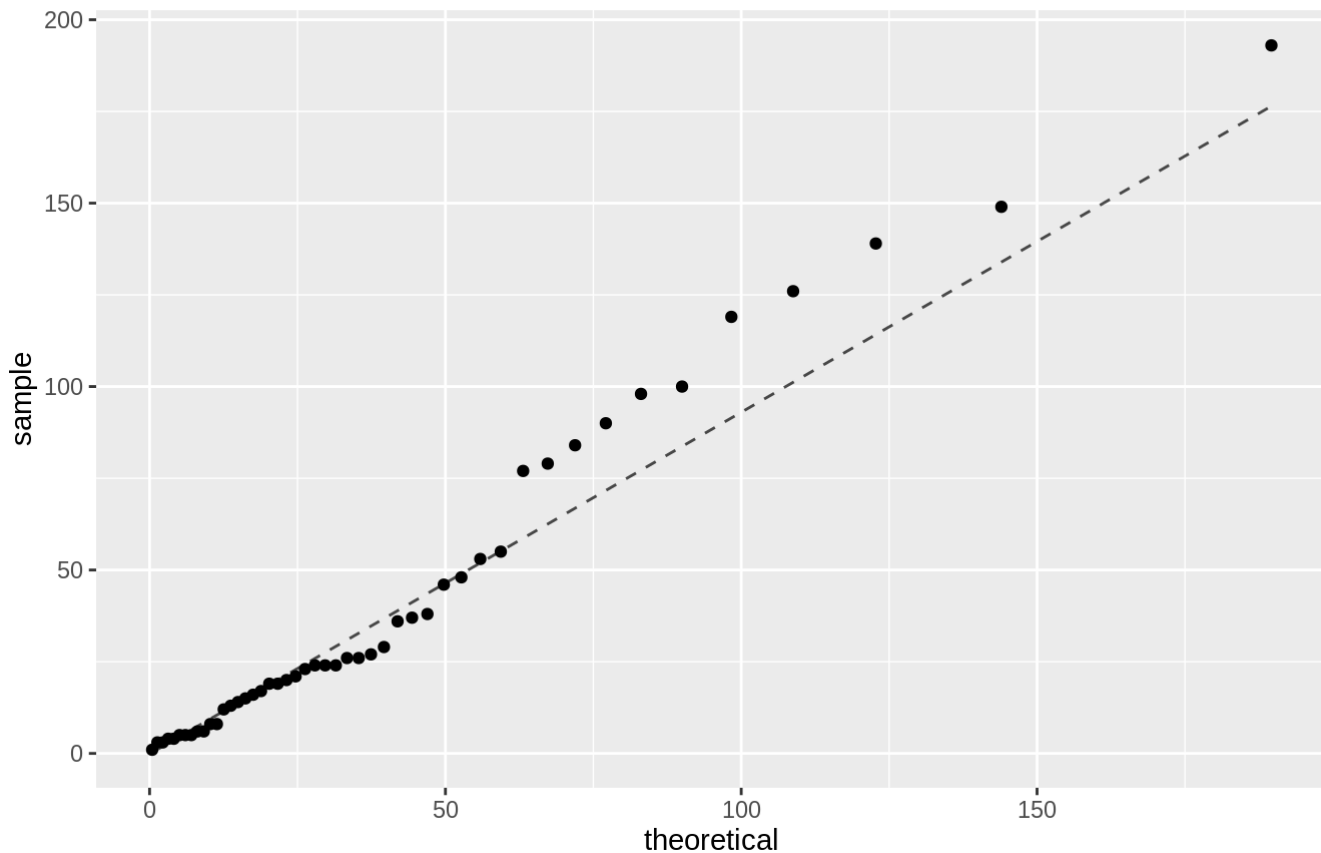


```
# removed
t1 <- c( 55, 20, 3, 46, 139, 3, 16, 15, 90, 4, 6, 24, 17, 193, 24, 53)
t2 <- c( 100, 98, 1, 5, 29, 84, 8, 8, 5, 14, 149, 6, 4, 26, 119, 24)
t3 <- c( 21, 26, 5, 36, 19, 19, 48, 79, 38, 37, 77, 12, 13, 27, 126, 23)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)

qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the Second Quantile) dt = 0.01, the first two and last infection event
s not included")
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the Second Quantile) $dt = 0.01$, the first two and last infection events not included

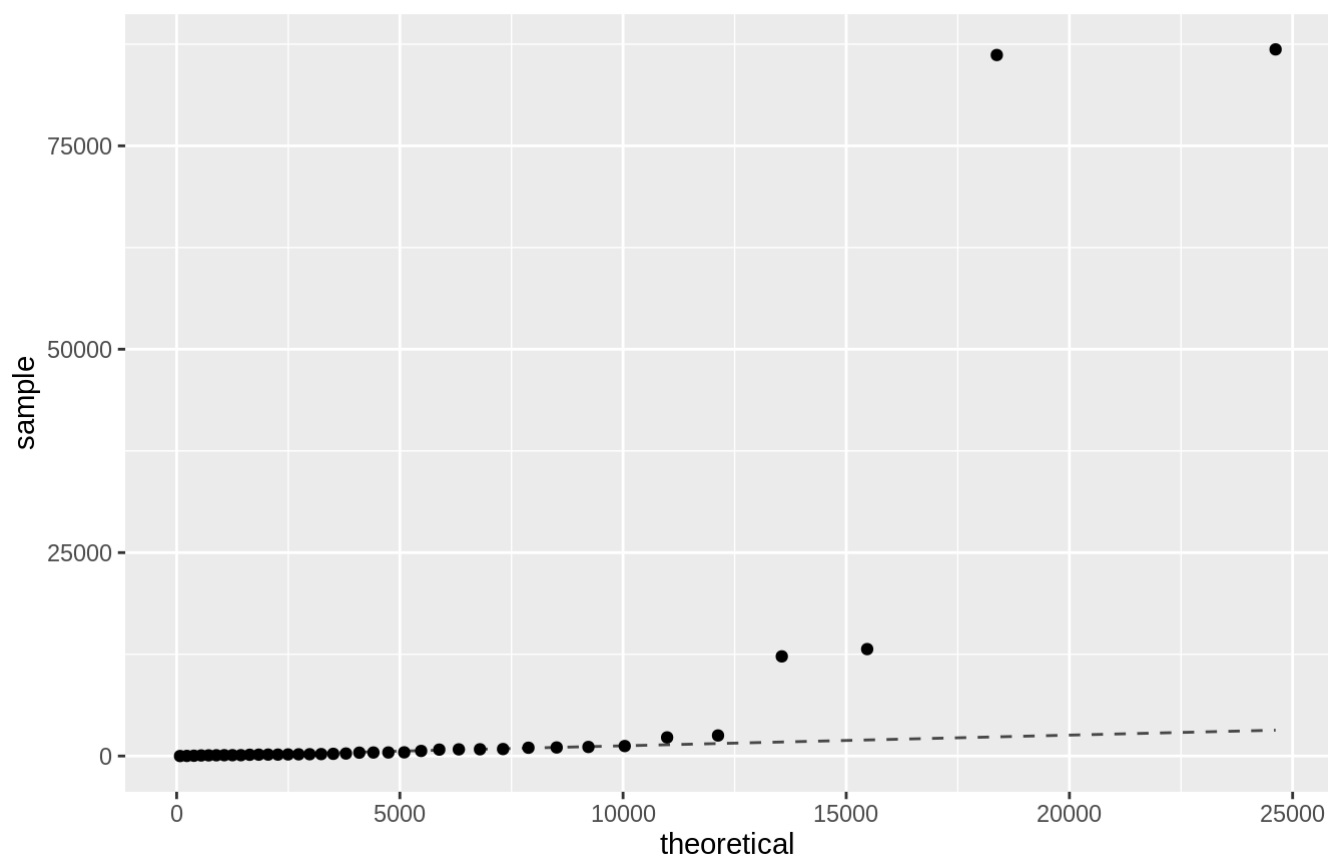


same as above, but $dt = 0.001$

```
t1 <- c(86853, 2286, 1018, 819, 104, 70, 36, 788, 222, 178, 309, 240, 154, 829, 858, 209,
, 103, 432, 12246)
t2 <- c(86161, 2525, 1227, 452, 271, 414, 169, 626, 83, 178, 197, 2, 1114, 1051, 93, 104,
, 15, 437, 13142)

t_all <- c()
t_all <- append(t1, t2)
qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the Second Quantile)  $dt = 0.001$ , including the first infection event")
```

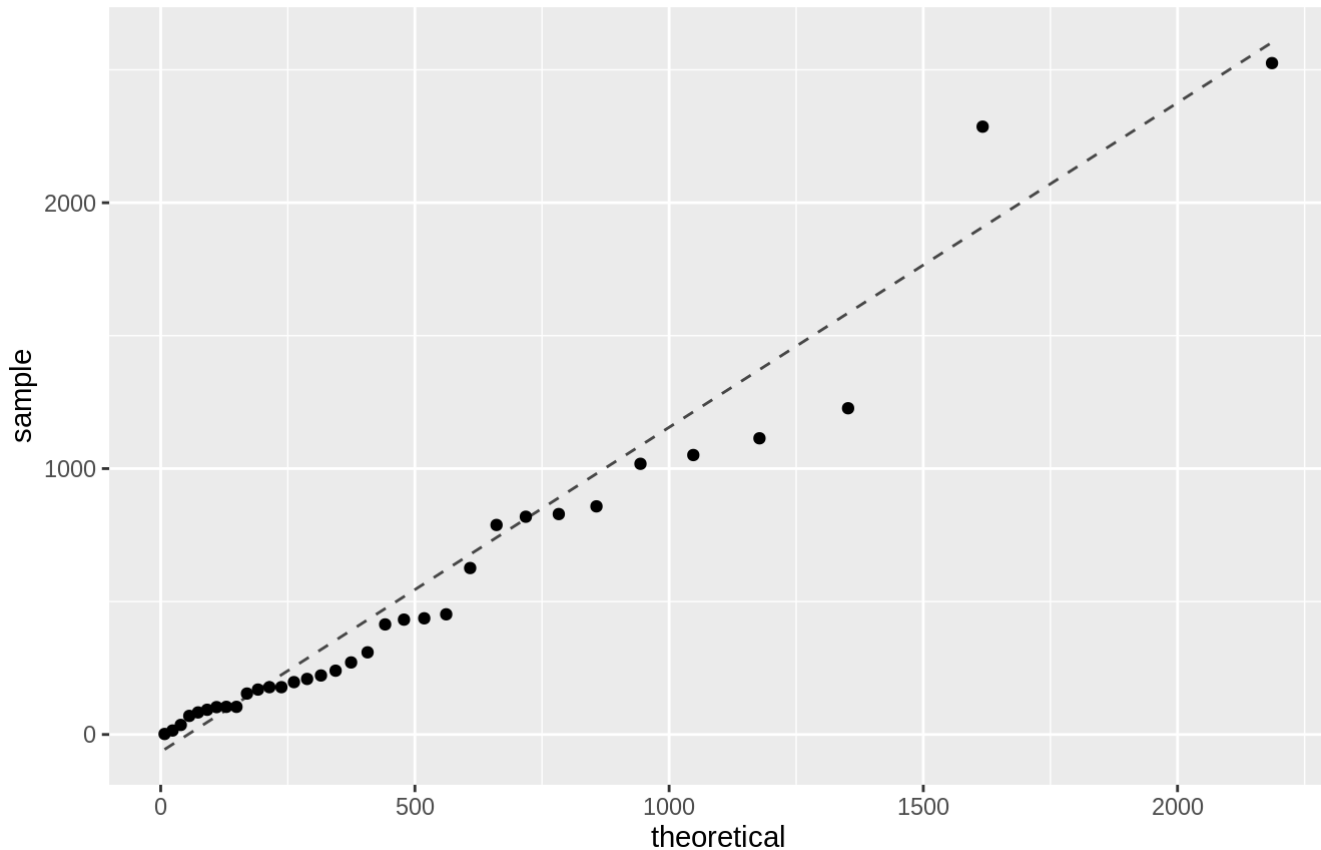
Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the Second Quantile) $dt = 0.001$, including the first infection event



```
# revised
t1 <- c( 2286, 1018, 819, 104, 70, 36, 788, 222, 178, 309, 240, 154, 829, 858, 209, 103,
432)
t2 <- c( 2525, 1227, 452, 271, 414, 169, 626, 83, 178, 197, 2, 1114, 1051, 93, 104, 15,
437)

t_all <- c()
t_all <- append(t1, t2)
qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the Second Quantile) dt = 0.001, the first and last infection events not included")
```

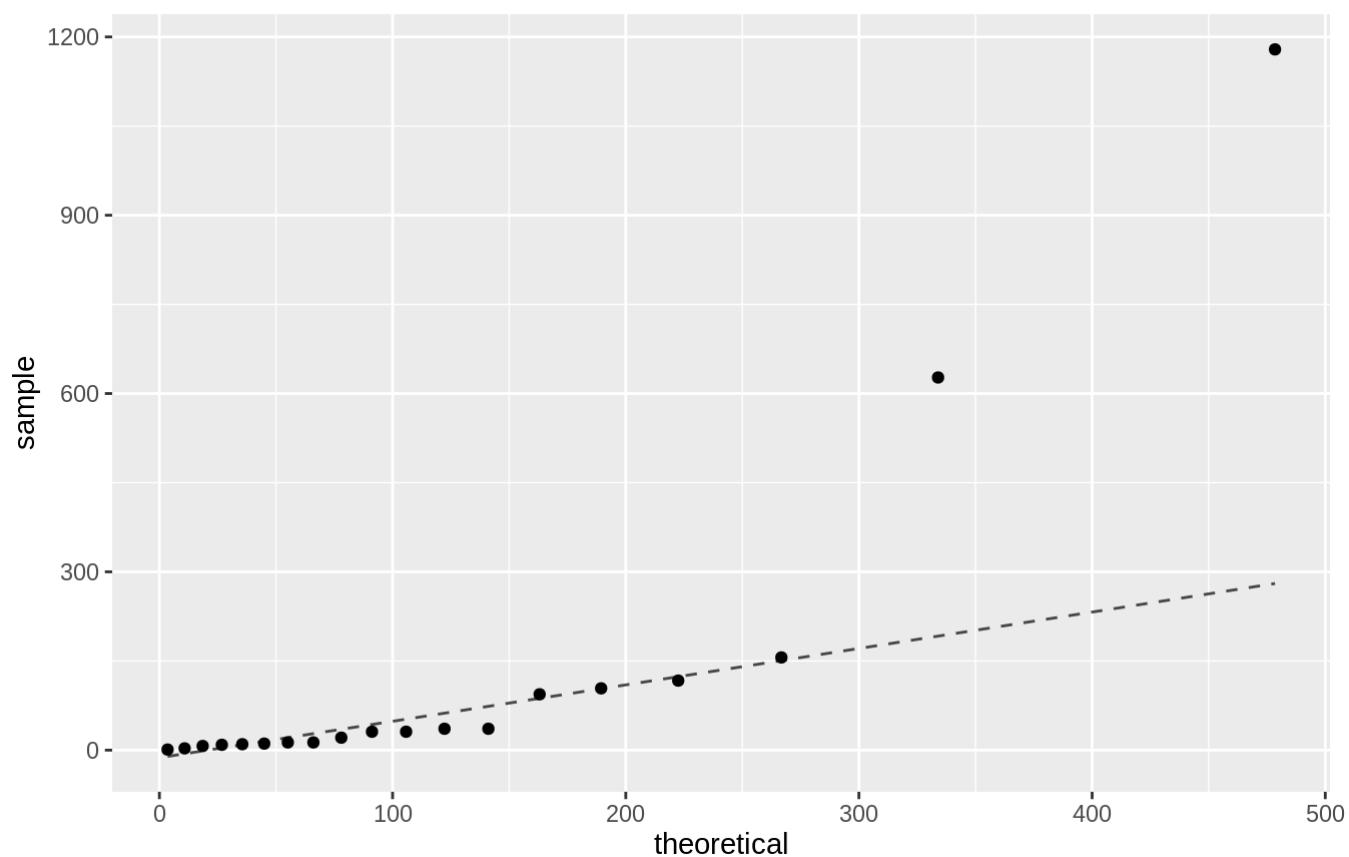
Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the Second Quantile) $dt = 0.001$, the first and last infection events not included



Deterministic Synchronous Fixed

```
t1 <- c(1179, 117, 7, 21, 13, 10, 156, 1, 9, 94, 36, 3, 31, 11, 31, 104, 36, 13, 627)
qqp(t1, "Synchronous, Fixed Threshold, Small World Waiting Time Distribution",
     "(Degree from the Second Quantile) including the first infection event")
```

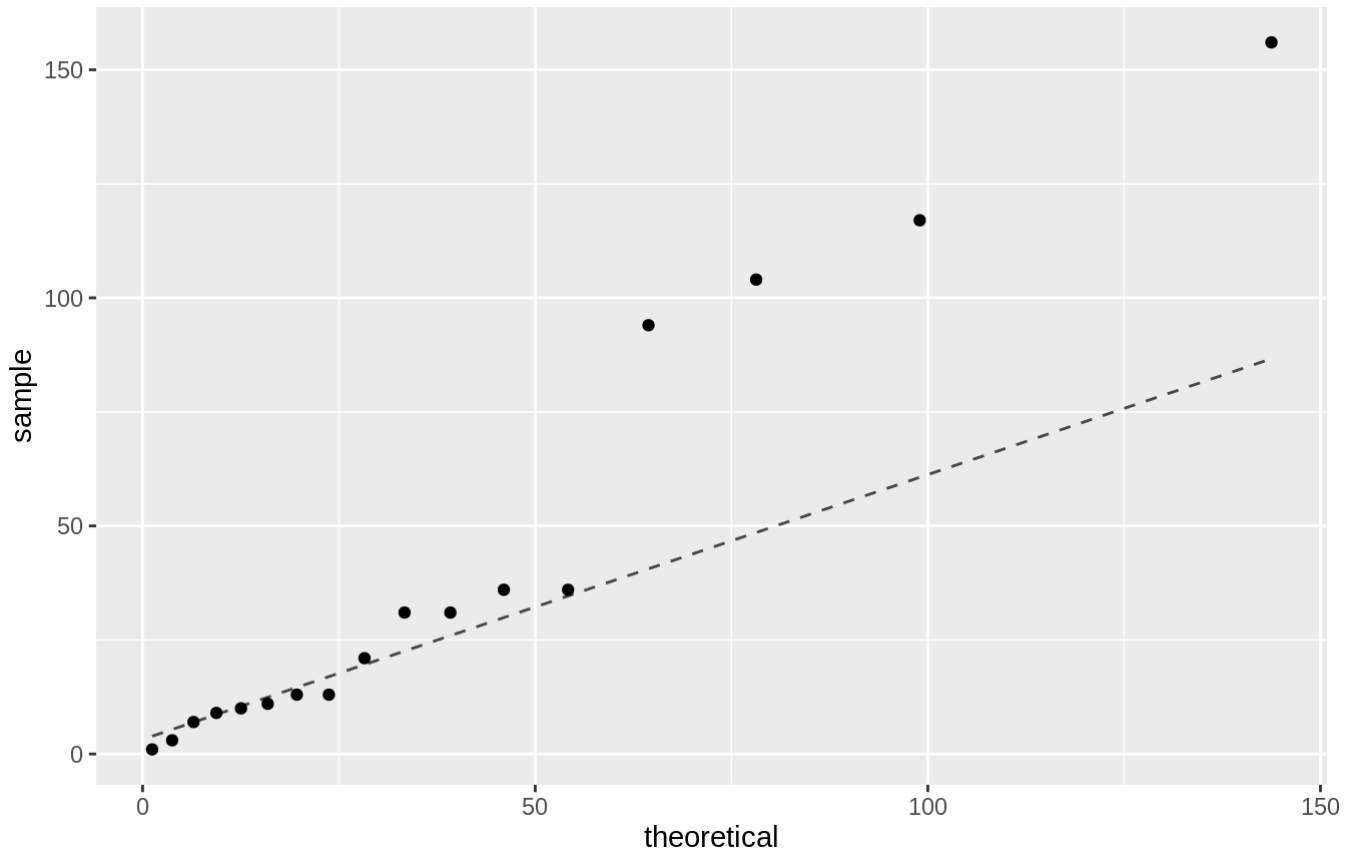
Synchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the Second Quantile) including the first infection event



```
t1 <- c( 117, 7, 21, 13, 10, 156, 1, 9, 94, 36, 3, 31, 11, 31, 104, 36, 13)
qqp(t1, "Synchronous, Small World Waiting Time Distribution",
      "(Degree from the Second Quantile) the first and last infection events not included"
)
```

Synchronous, Small World Waiting Time Distribution

(Degree from the Second Quantile) the first and last infection events not included



Synchronous Flip Small World

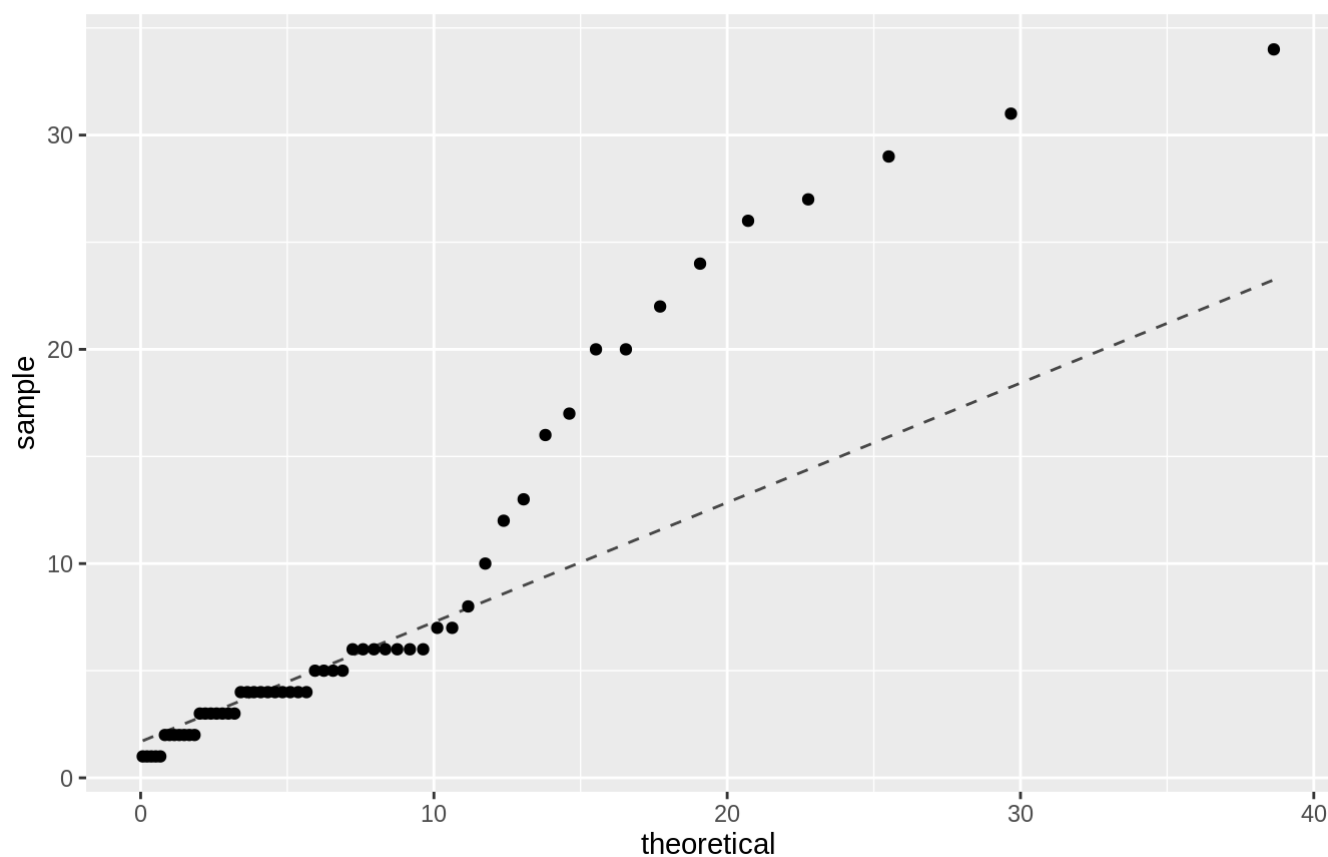
```
t1 <- c(34, 24, 7, 4, 4, 3, 3, 5, 6, 1, 4, 4, 4, 3, 5, 4, 6, 4, 20)
t2 <- c(29, 6, 6, 5, 2, 1, 1, 8, 4, 6, 4, 2, 12, 13, 2, 17, 3, 16, 26)
t3 <- c(27, 2, 22, 2, 3, 1, 3, 3, 6, 2, 6, 1, 4, 5, 10, 2, 20, 7, 31)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)

qqp(t_all, "Synchronous, Flip Small World Waiting Time Distribution",
     "(Degree from the Second Quantile) dt = 0.001, including the first infection event")
```

Synchronous, Flip Small World Waiting Time Distribution

(Degree from the Second Quantile) $dt = 0.001$, including the first infection event



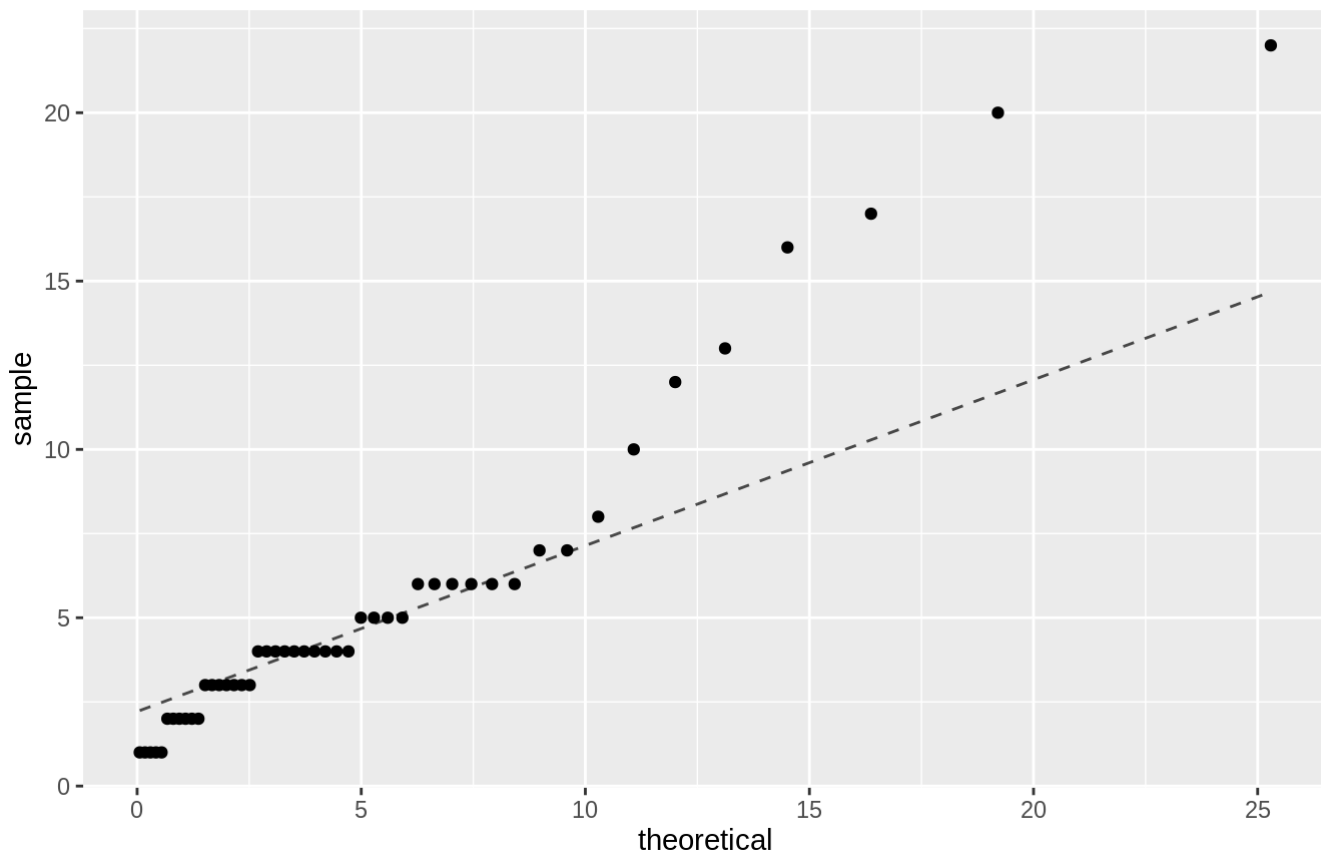
```
# revised
t1 <- c( 7, 4, 4, 3, 3, 5, 6, 1, 4, 4, 4, 3, 5, 4, 6, 4)
t2 <- c( 6, 5, 2, 1, 1, 8, 4, 6, 4, 2, 12, 13, 2, 17, 3, 16)
t3 <- c( 22, 2, 3, 1, 3, 3, 6, 2, 6, 1, 4, 5, 10, 2, 20, 7)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)

qqp(t_all, "Synchronous, Flip Small World Waiting Time Distribution",
     "(Degree from the Second Quantile) dt = 0.001, the first two and last one infection
     events not included")
```


Synchronous, Flip Small World Waiting Time Distribution

(Degree from the Second Quantile) $dt = 0.001$, the first two and last one infection events not included



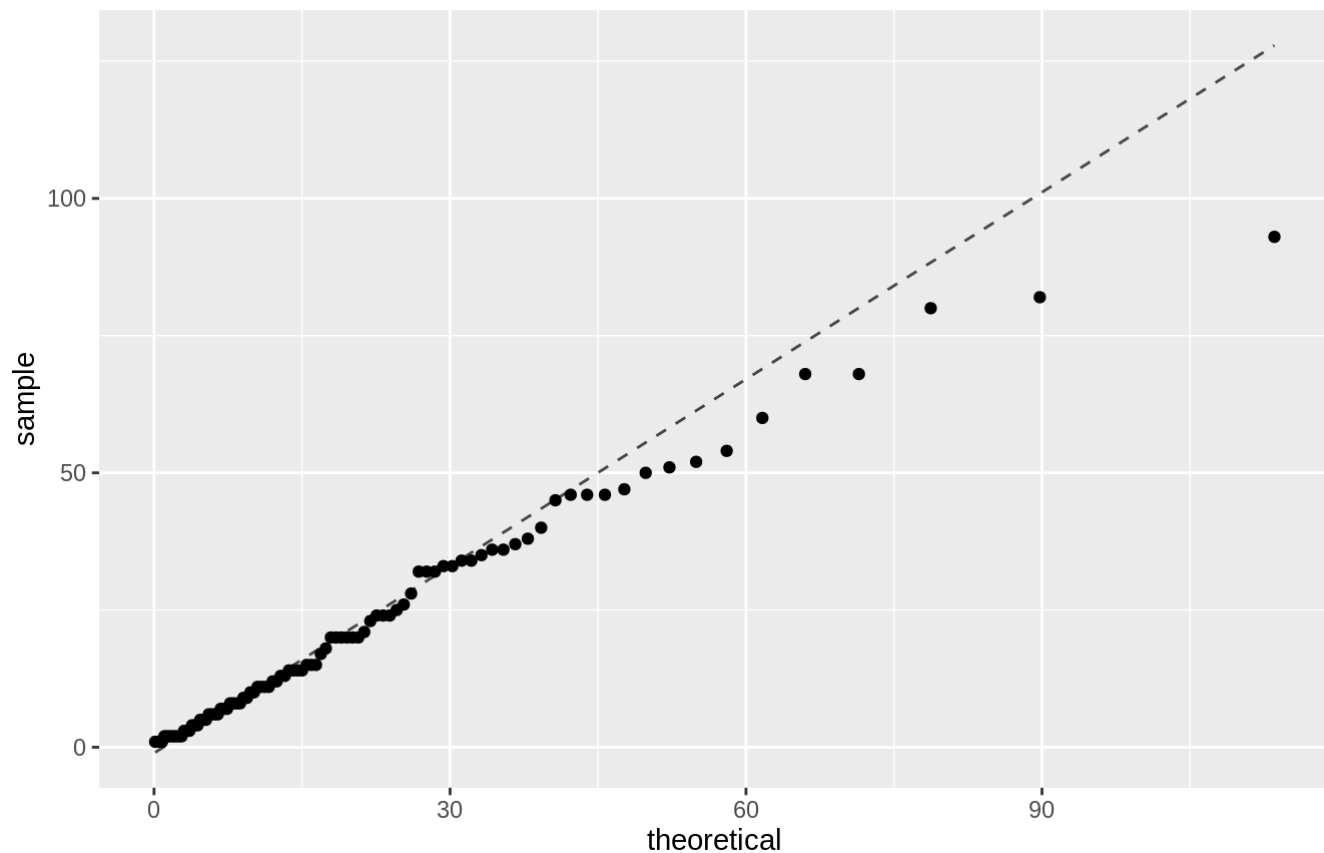
```
t1 <- c(50, 5, 11, 54, 1, 3, 34, 11, 24, 37, 1, 12, 14, 14, 14, 34, 33, 8, 36)
t2 <- c(93, 47, 35, 8, 20, 28, 2, 25, 13, 2, 11, 20, 2, 6, 4, 15, 14, 5, 46)
t3 <- c(68, 8, 6, 20, 82, 6, 2, 20, 15, 12, 6, 9, 4, 11, 1, 5, 23, 10, 68)
t4 <- c(80, 36, 2, 40, 17, 7, 2, 32, 8, 24, 4, 7, 9, 15, 52, 38, 20, 32, 33)
t5 <- c(60, 46, 51, 3, 1, 45, 2, 13, 20, 3, 7, 2, 26, 10, 21, 24, 18, 46, 32)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip Small World Waiting Time Distribution",
     "(First Quantile) dt = 0.0001, including the first infection event")
```

Synchronous, Flip Small World Waiting Time Distribution

(First Quantile) dt = 0.0001, including the first infection event



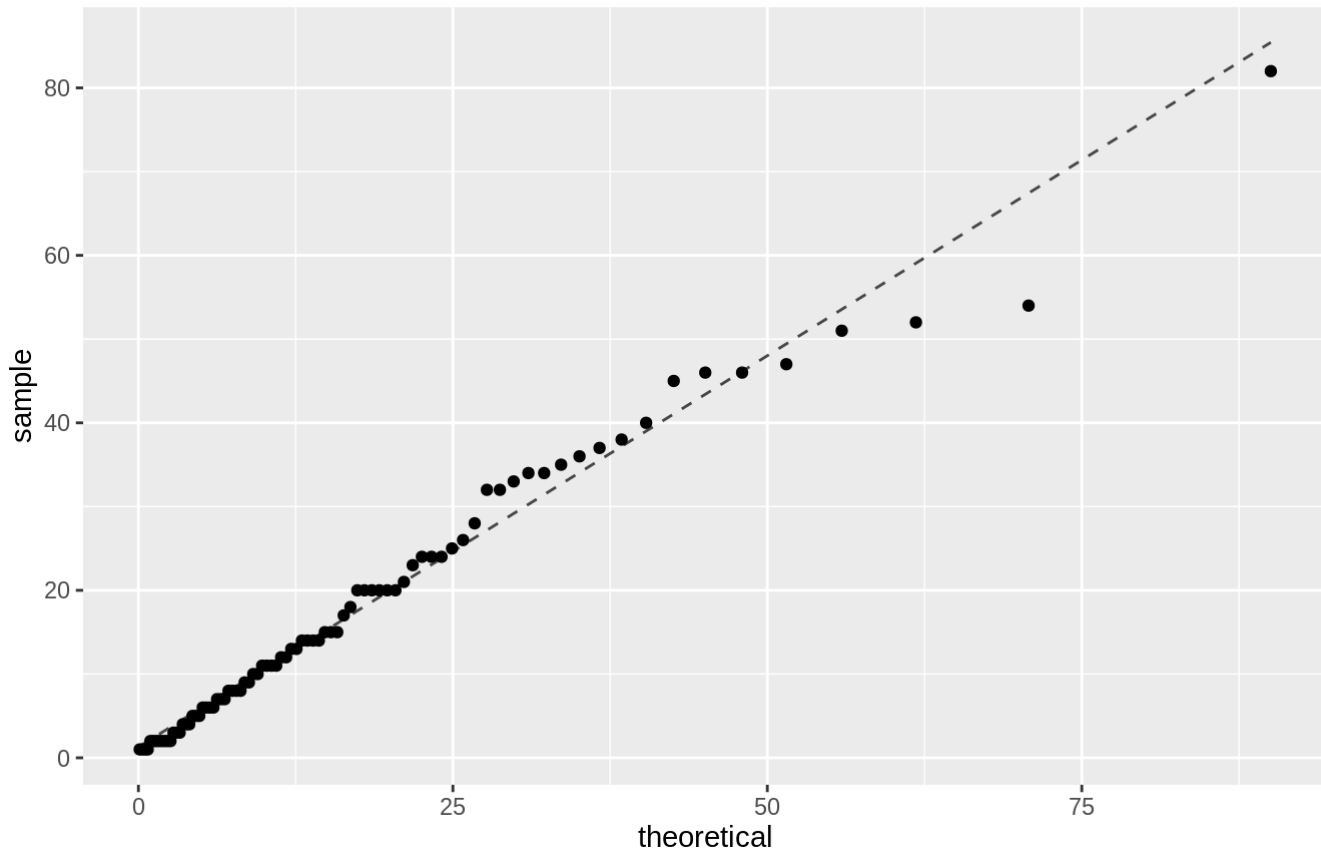
```
# revised
t1 <- c( 5, 11, 54, 1, 3, 34, 11, 24, 37, 1, 12, 14, 14, 14, 34, 33, 8)
t2 <- c( 47, 35, 8, 20, 28, 2, 25, 13, 2, 11, 20, 2, 6, 4, 15, 14, 5)
t3 <- c( 8, 6, 20, 82, 6, 2, 20, 15, 12, 6, 9, 4, 11, 1, 5, 23, 10)
t4 <- c( 36, 2, 40, 17, 7, 2, 32, 8, 24, 4, 7, 9, 15, 52, 38, 20, 32)
t5 <- c( 46, 51, 3, 1, 45, 2, 13, 20, 3, 7, 2, 26, 10, 21, 24, 18, 46)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip Small World Waiting Time Distribution",
     "(First Quantile) dt = 0.0001, the first and last infection events not included")
```

Synchronous, Flip Small World Waiting Time Distribution

(First Quantile) $dt = 0.0001$, the first and last infection events not included



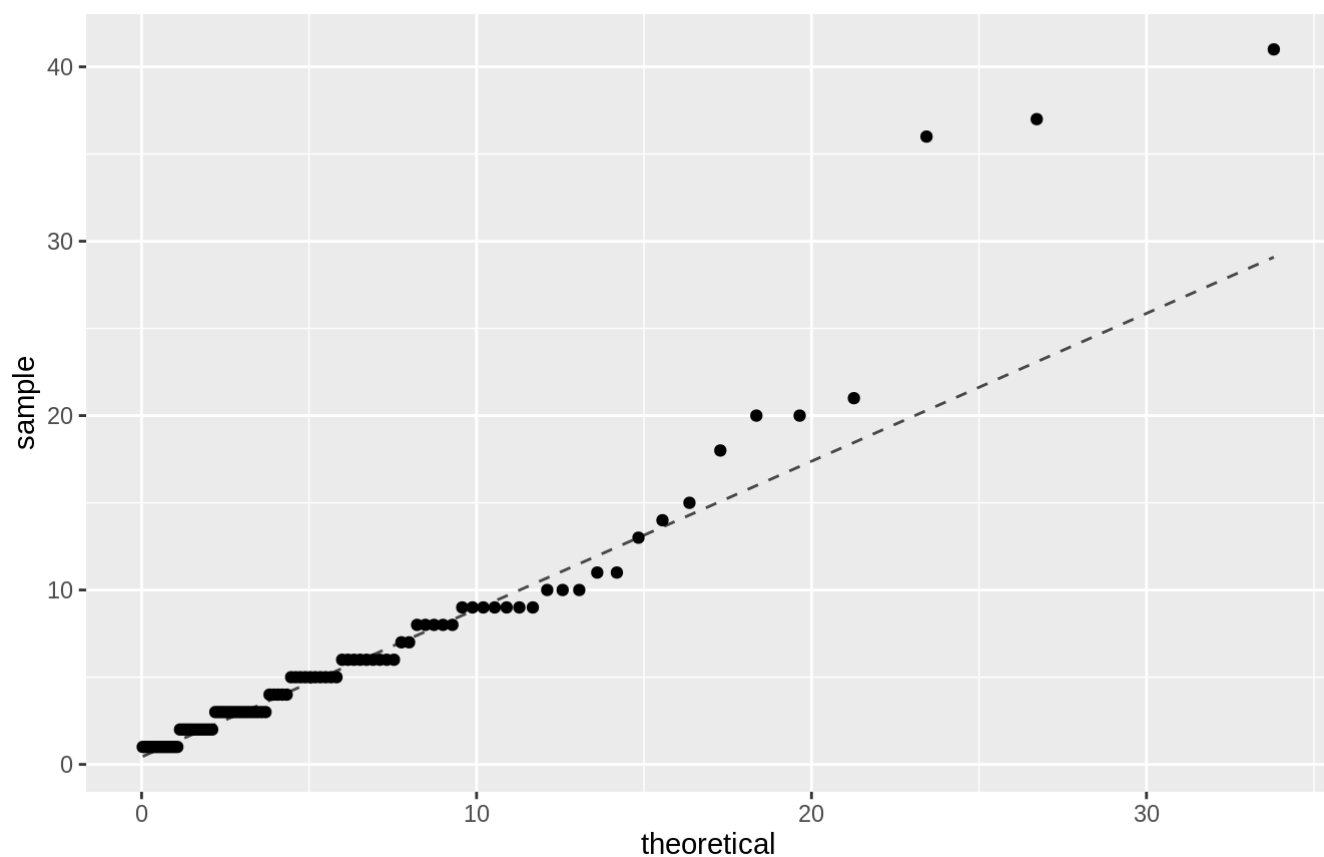
Synchronous, Flip, Random Graph

```
t1 <- c(36, 5, 8, 9, 3, 4, 2, 2, 18, 2, 2, 1, 8, 9, 9, 6, 1, 5, 6)
t2 <- c(21, 8, 11, 1, 6, 6, 2, 10, 2, 1, 3, 6, 10, 4, 5, 7, 1, 3, 6)
t3 <- c(41, 3, 9, 3, 5, 3, 3, 11, 3, 3, 5, 1, 3, 3, 3, 4, 5, 4, 13)
t4 <- c(14, 20, 2, 8, 9, 5, 9, 5, 1, 2, 4, 10, 8, 1, 3, 2, 1, 6, 20)
t5 <- c(37, 1, 6, 6, 3, 1, 1, 3, 7, 2, 5, 2, 9, 1, 2, 1, 1, 5, 15)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip Random Graph Waiting Time Distribution",
     "including the first infection event")
```

Synchronous, Flip Random Graph Waiting Time Distribution including the first infection event



revised

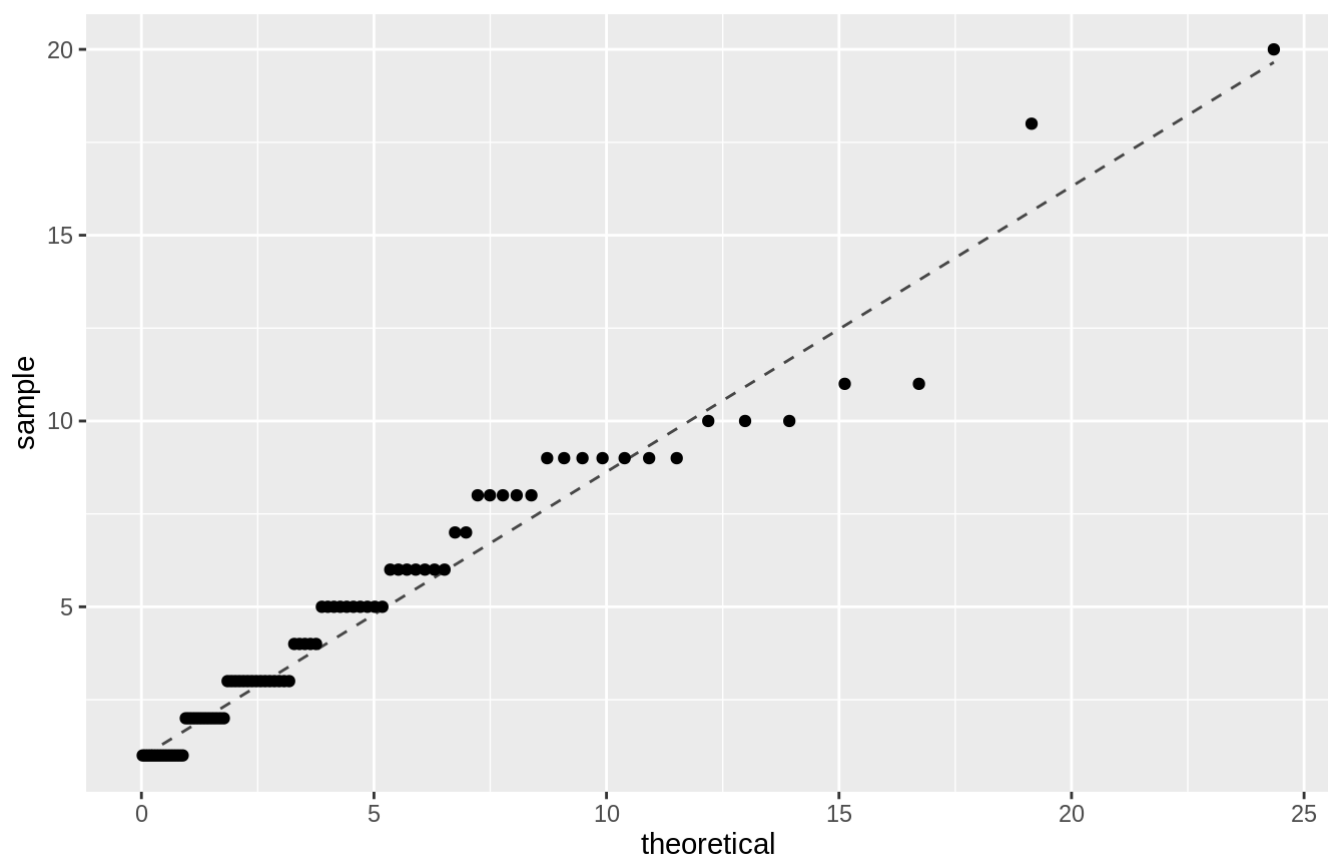
```
t1 <- c(5, 8, 9, 3, 4, 2, 2, 18, 2, 2, 1, 8, 9, 9, 6, 1, 5)
t2 <- c(8, 11, 1, 6, 6, 2, 10, 2, 1, 3, 6, 10, 4, 5, 7, 1, 3)
t3 <- c(3, 9, 3, 5, 3, 3, 11, 3, 3, 5, 1, 3, 3, 3, 4, 5, 4)
t4 <- c(20, 2, 8, 9, 5, 9, 5, 1, 2, 4, 10, 8, 1, 3, 2, 1, 6)
t5 <- c(1, 6, 6, 3, 1, 1, 3, 7, 2, 5, 2, 9, 1, 2, 1, 1, 5)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip Random Graph Waiting Time Distribution",
     "the first and last infection events not included")
```

Synchronous, Flip Random Graph Waiting Time Distribution

the first and last infection events not included



deterministic, synchronous, fixed trial, random graph

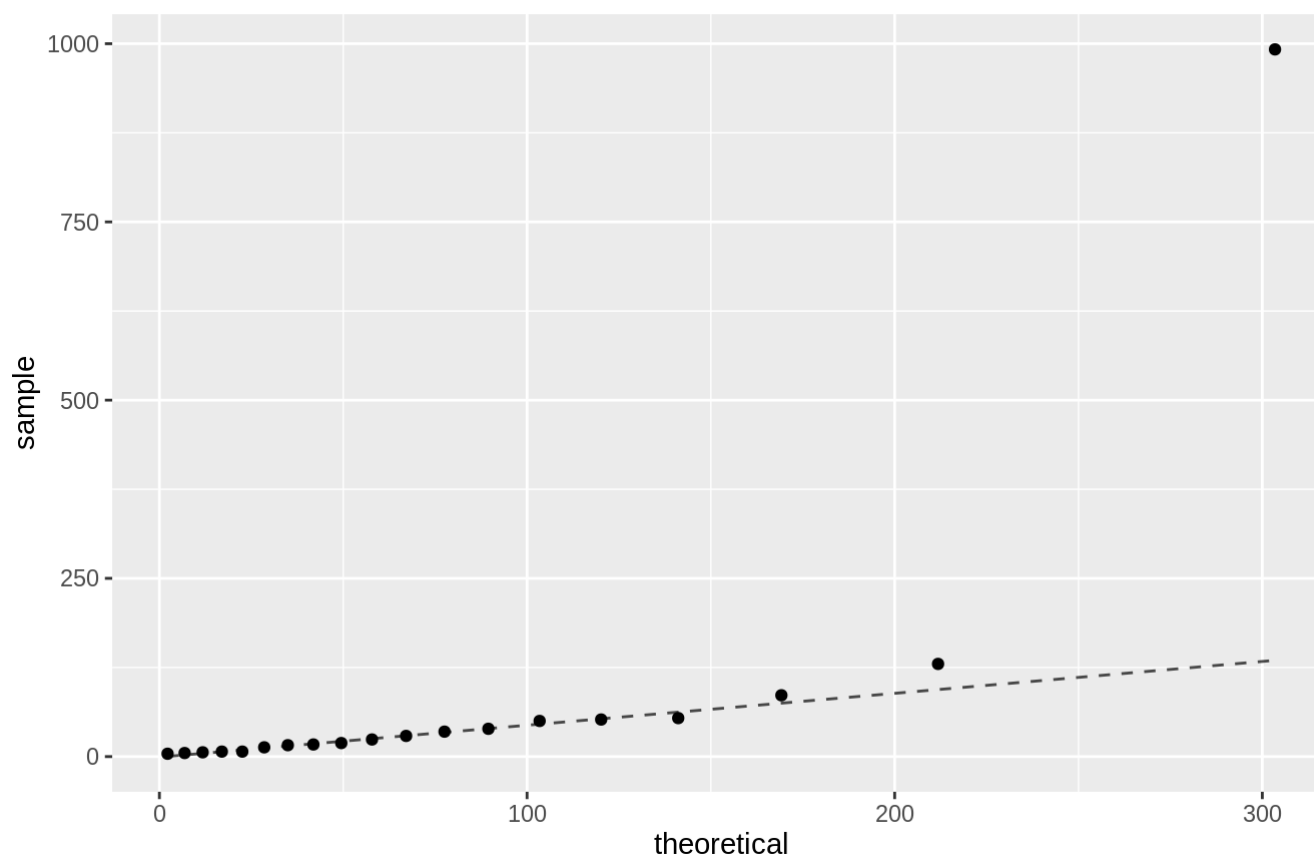
```
DST_RG <- c(992, 13, 35, 19, 17, 39, 7, 7, 6, 54, 16, 52, 50, 5, 24, 86, 4, 130, 29)
mean(DST_RG)
```

```
## [1] 83.42105
```

```
lambda <- 1 / mean(DST_RG)

gf_qq(~DST_RG, distribution = qexp, dparams = list(rate = lambda),
  title = "Synchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
  subtitle = "including the first infection event")%>%
  gf_qqline(distribution = qexp, dparams = list(rate = lambda))
```

Synchronous, Fixed Threshold, Random Graph Waiting Time Distribution including the first infection event



```
# Revised, cuz the first 1 is a different story
DST_RG2 <- c(13, 35, 19, 17, 39, 7, 7, 6, 54, 16, 52, 50, 5, 24, 86, 4, 130)
mean(DST_RG2)
```

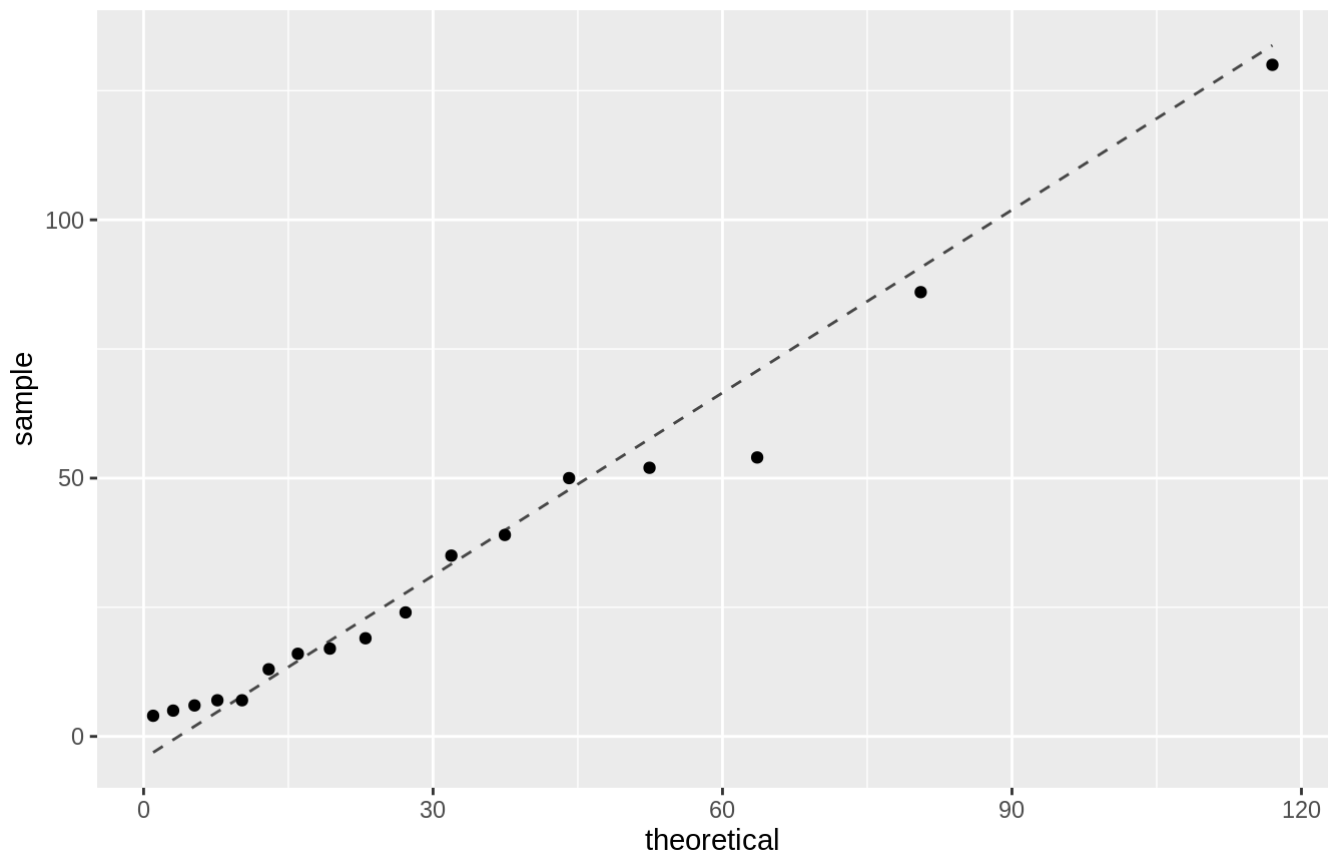
```
## [1] 33.17647
```

```
lambda_2 <- 1 / mean(DST_RG2)

gf_qq(~DST_RG2, distribution = qexp, dparams = list(rate = lambda_2),
      title = "Synchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
      subtitle = "the first infection and last events not included")%>%
  gf_qqline(distribution = qexp, dparams = list(rate = lambda_2))
```

Synchronous, Fixed Threshold, Random Graph Waiting Time Distribution

the first infection and last events not included



deterministic, synchronous, fixed trial, small world

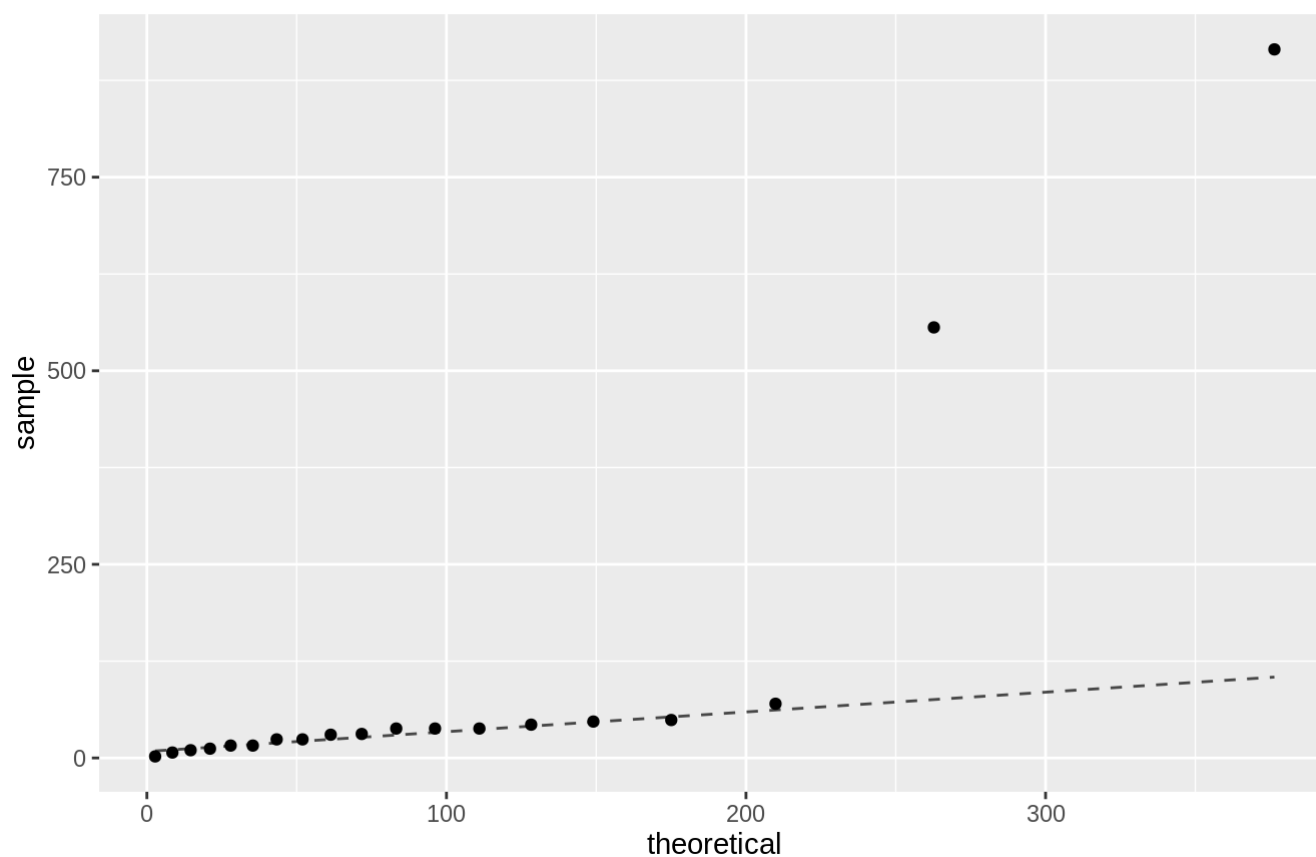
```
DST_SW <- c(915, 70, 2, 47, 38, 7, 24, 49, 16, 31, 10, 30, 24, 16, 38, 38, 43, 12, 556)
mean(DST_SW)
```

```
## [1] 103.4737
```

```
lambda <- 1 / mean(DST_SW)

gf_qq(~DST_SW, distribution = qexp, dparams = list(rate = lambda),
      title = "Synchronous, Fixed Threshold, Small World Waiting Time Distribution",
      subtitle = "including the first infection event")%>%
gf_qqline(distribution = qexp, dparams = list(rate = lambda))
```

Synchronous, Fixed Threshold, Small World Waiting Time Distribution including the first infection event



```
# Revised, not including the first and the last node
```

```
DST_SW2 <- c(70, 2, 47, 38, 7, 24, 49, 16, 31, 10, 30, 24, 16, 38, 38, 43, 12)
```

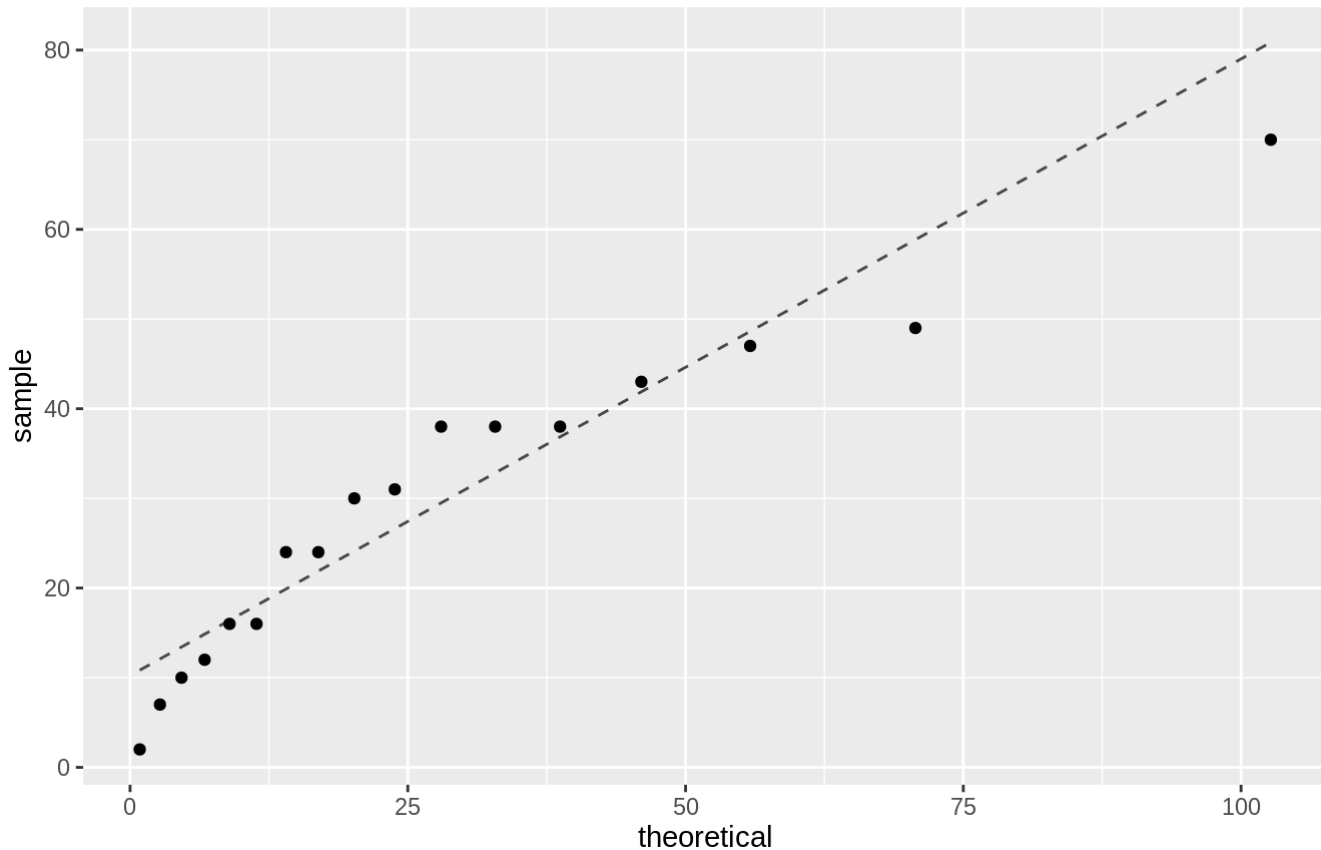
```
mean(DST_SW2)
```

```
## [1] 29.11765
```

```
lambda_2 <- 1 / mean(DST_SW2)
```

```
gf_qq(~DST_SW2, distribution = qexp, dparams = list(rate = lambda_2),
      title = "Synchronous, Fixed Threshold, Small World Waiting Time Distribution",
      subtitle = "the first and last infections events removed")%>%
gf_qqline(distribution = qexp, dparams = list(rate = lambda_2))
```


Synchronous, Fixed Threshold, Small World Waiting Time Distribution the first and last infections events removed



Stochastic, asynchronous updates, fixed threshold, small world

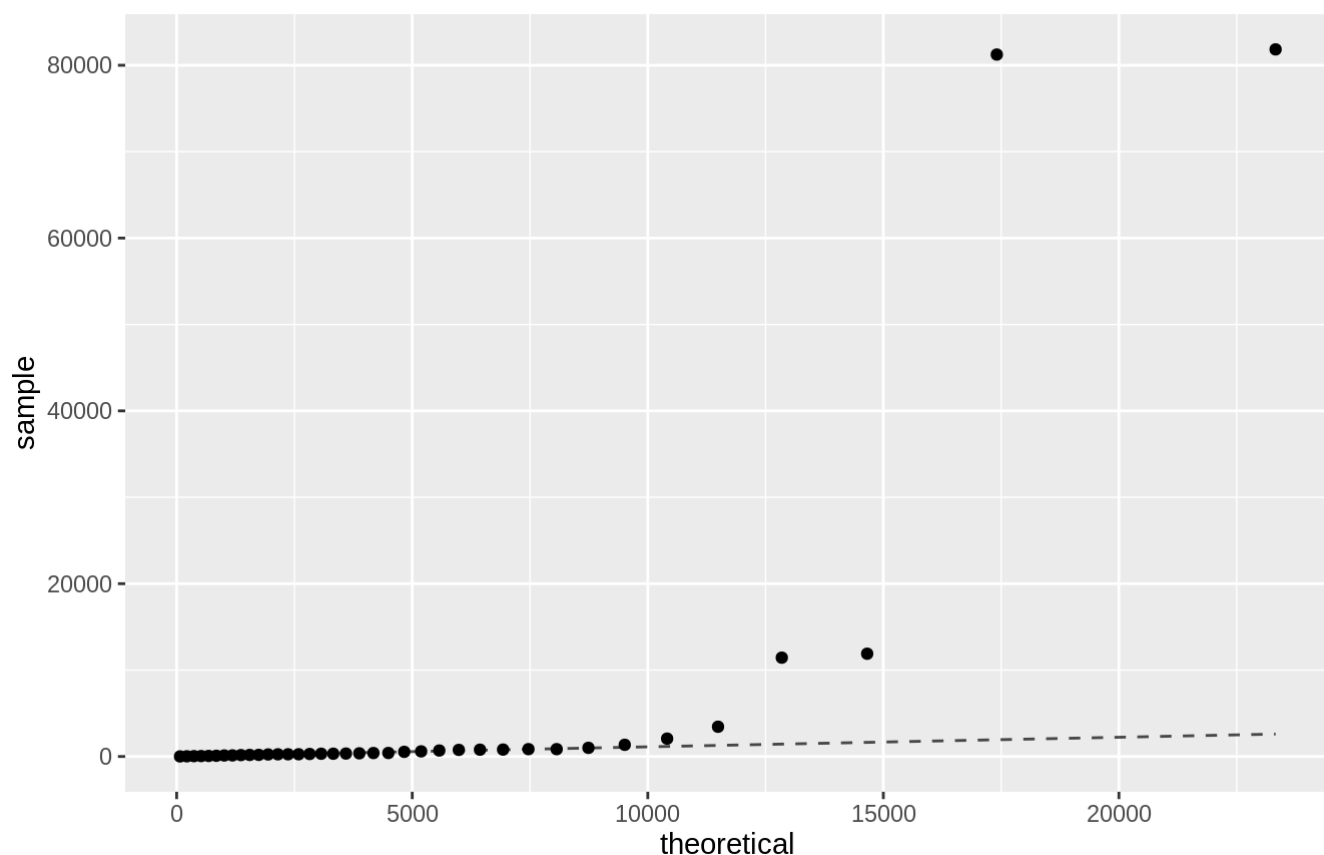
```
t1 <- c(81837, 3444, 764, 341, 367, 52, 788, 24, 237, 260, 290, 10, 801, 254, 851, 181,
693, 65, 11895)
t2 <- c(81238, 2068, 1355, 851, 162, 84, 128, 401, 320, 119, 189, 42, 538, 1002, 322, 25
7, 407, 593, 11439)

t_all <- c()
t_all <- append(t1, t2)

lambda <- 1/ mean(t_all)

gf_qq(~t_all, distribution = qexp, dparams = list(rate = lambda),
      title = "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      subtitle = "including the first infection event")%>%
gf_qqline(distribution = qexp, dparams = list(rate = lambda))
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution including the first infection event



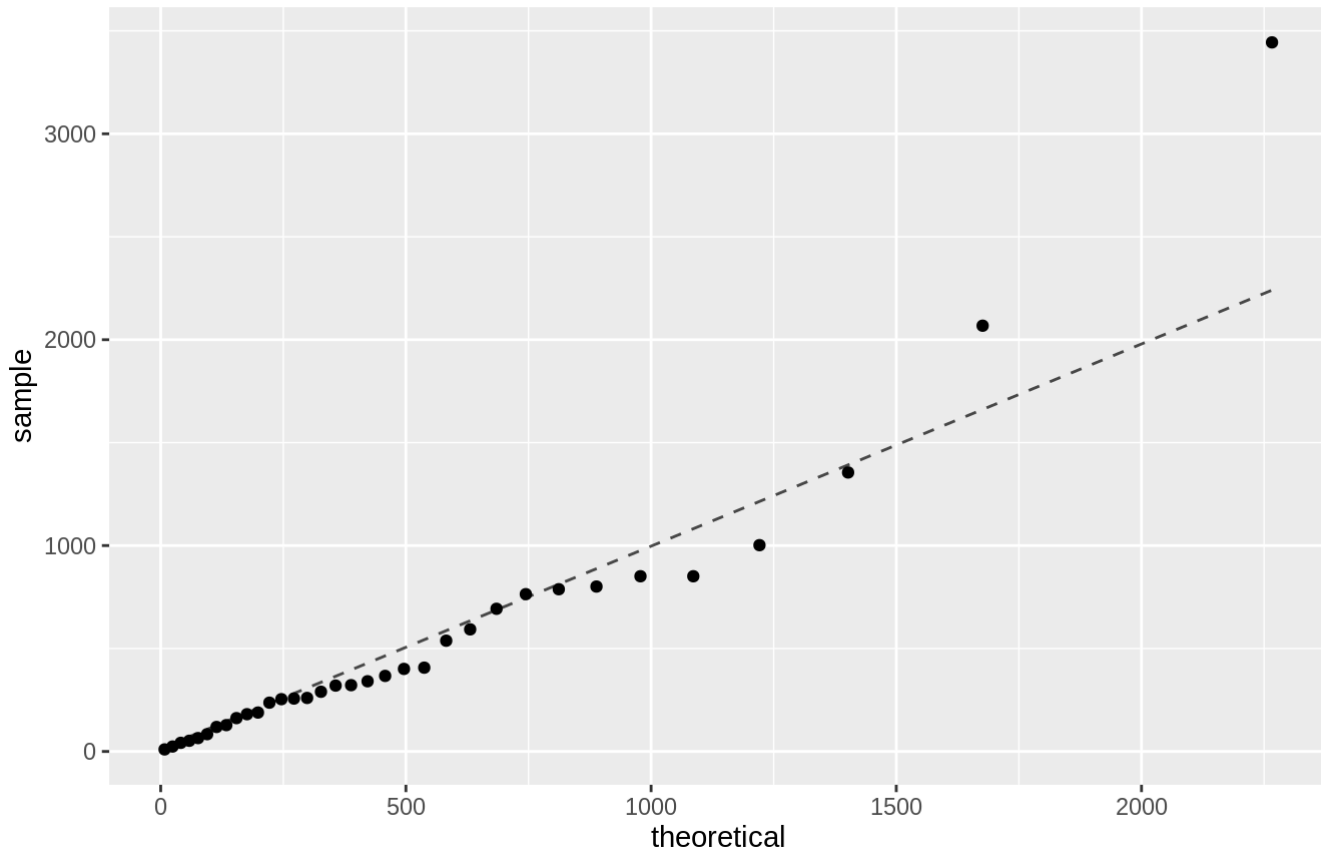
```
# remove the first and the last infection events
new_t1 <- c( 3444, 764, 341, 367, 52, 788, 24, 237, 260, 290, 10, 801, 254, 851, 181, 6
93, 65)
new_t2 <- c( 2068, 1355, 851, 162, 84, 128, 401, 320, 119, 189, 42, 538, 1002, 322, 257
, 407, 593)

new_t_all <- c()
new_t_all <- append(new_t1, new_t2)

new_lambda <- 1/ mean(new_t_all)

gf_qq(~new_t_all, distribution = qexp, dparams = list(rate = new_lambda),
      title = "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      subtitle = "the first and last infection events removed")%>%
gf_qqline(distribution = qexp, dparams = list(rate = new_lambda))
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution the first and last infection events removed



Stochastic Asynchronous Fixed Threshold, Random Graph

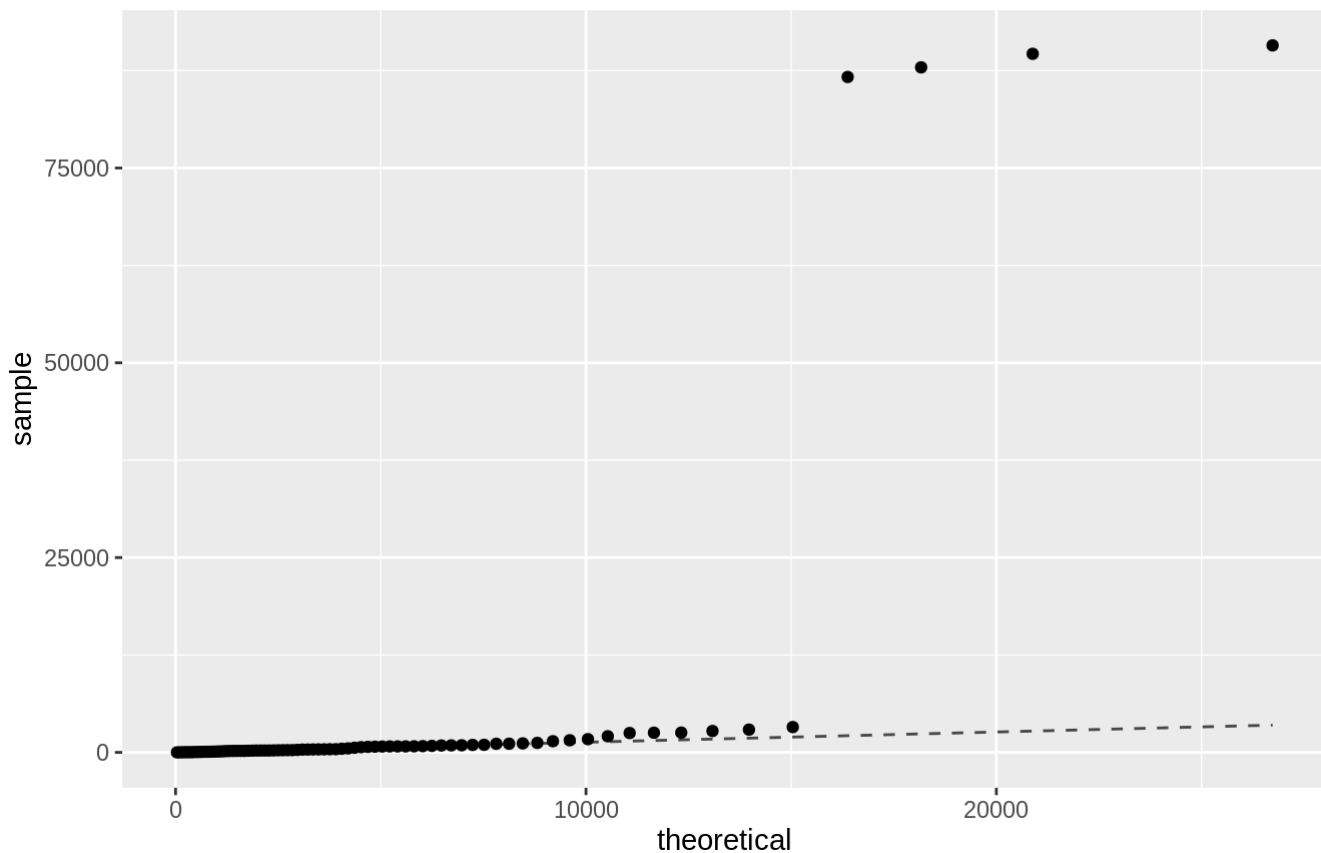
```
# dt = 0.001
t1 <- c(86684, 835, 769, 244, 379, 53, 780, 290, 27, 1155, 18, 2, 367, 184, 163, 1436, 2
523, 120, 3251)
t2 <- c(89654, 411, 914, 766, 285, 212, 595, 130, 359, 972, 194, 65, 226, 25, 1219, 900,
1698, 1556, 2069)
t3 <- c(87915, 243, 404, 279, 670, 177, 884, 11, 195, 750, 244, 77, 240, 103, 1104, 512,
2744, 957, 2919)
t4 <- c(90735, 392, 49, 322, 709, 259, 91, 467, 27, 1111, 81, 272, 192, 767, 385, 804, 2
536, 730, 2487)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)

lambda <- 1/ mean(t_all)

gf_qq(~t_all, distribution = qexp, dparams = list(rate = lambda),
      title = "Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
      subtitle = "including the first infection event")%>%
  gf_qqline(distribution = qexp, dparams = list(rate = lambda))
```

Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution including the first infection event



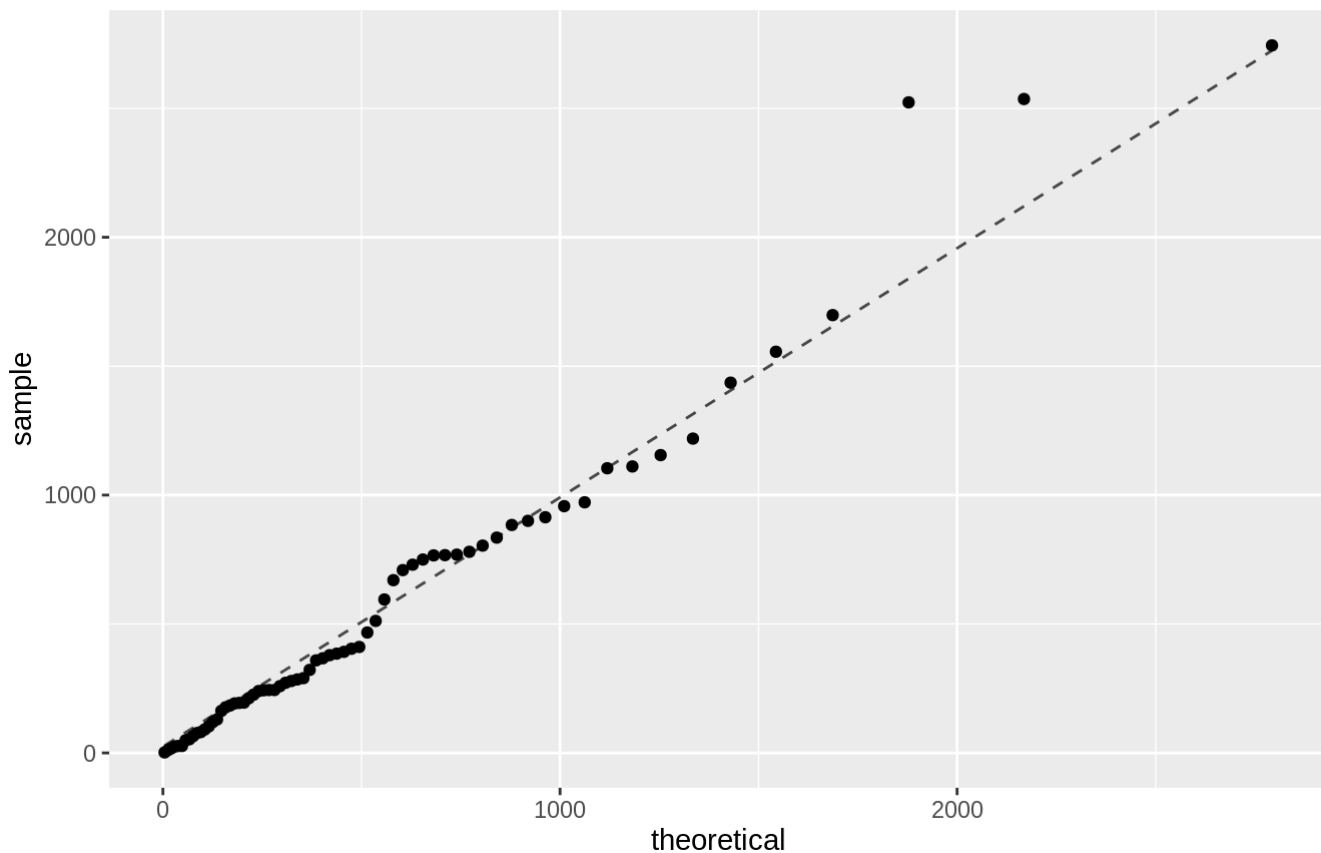
```
# revised
new_t1 <- c(835, 769, 244, 379, 53, 780, 290, 27, 1155, 18, 2, 367, 184, 163, 1436, 2523, 120)
new_t2 <- c(411, 914, 766, 285, 212, 595, 130, 359, 972, 194, 65, 226, 25, 1219, 900, 1698, 1556)
new_t3 <- c(243, 404, 279, 670, 177, 884, 11, 195, 750, 244, 77, 240, 103, 1104, 512, 2744, 957)
new_t4 <- c(392, 49, 322, 709, 259, 91, 467, 27, 1111, 81, 272, 192, 767, 385, 804, 2536, 730)

new_t_all <- c()
new_t_all <- append(new_t1, new_t2)
new_t_all <- append(new_t_all, new_t3)
new_t_all <- append(new_t_all, new_t4)

new_lambda <- 1/ mean(new_t_all)

gf_qq(~ new_t_all, distribution = qexp, dparams = list(rate = new_lambda),
      title = "Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
      subtitle = "the first and last infection events removed")%>%
  gf_qqline(distribution = qexp, dparams = list(rate = new_lambda))
```

Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution the first and last infection events removed



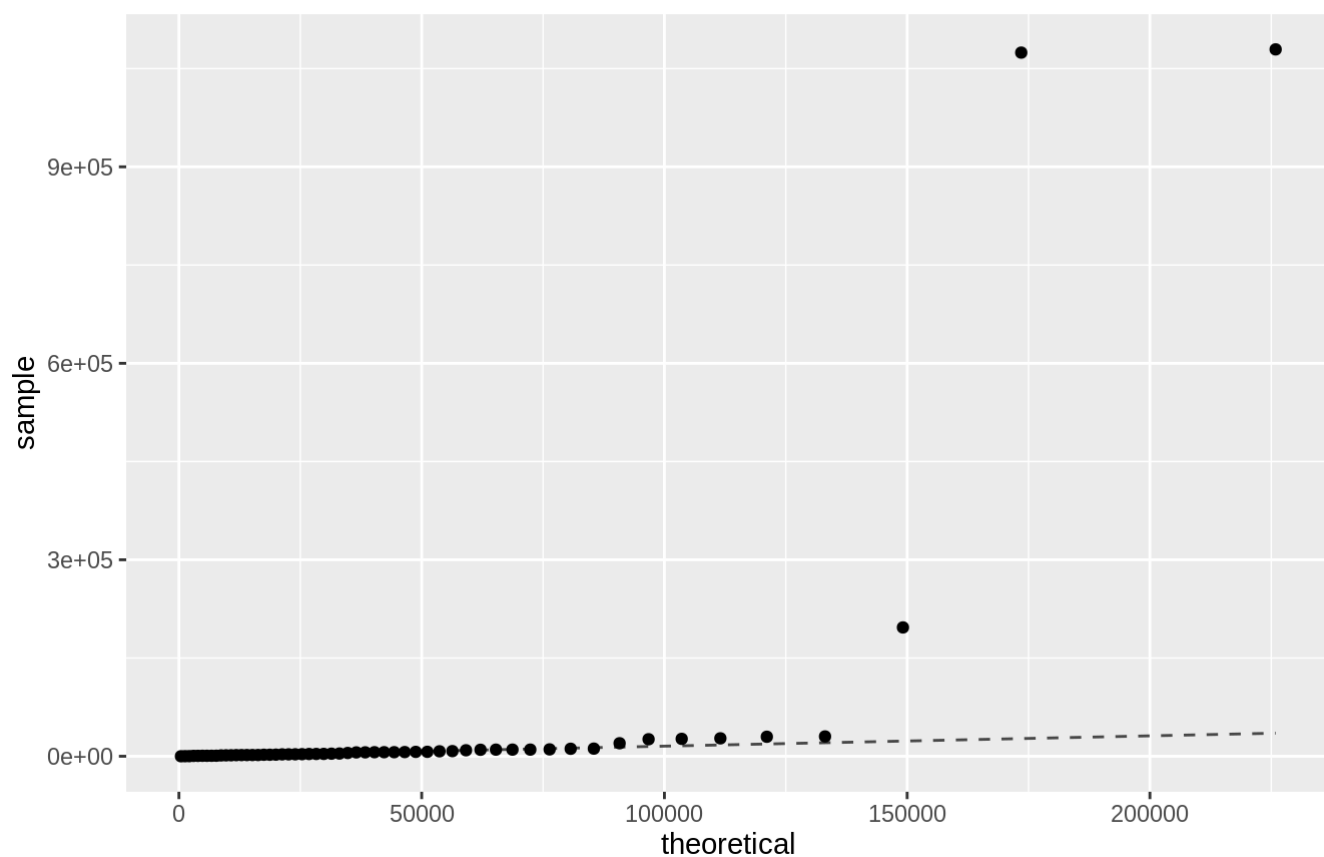
```
# ft = 0.0001
t1 <- c(196680, 1903, 7838, 6388, 729, 10133, 585, 87, 2296, 11413, 1489, 11633, 10084,
142, 3436, 19847, 5, 26539, 6198)
t2 <- c(1074405, 5966, 3921, 2446, 6769, 1402, 5875, 1783, 4158, 9124, 540, 2862, 700, 1
857, 6188, 10111, 29757, 4995, 25965)
t3 <- c(1079341, 3504, 7547, 799, 6672, 701, 6168, 2300, 1838, 9889, 2978, 1711, 1284, 3
157, 3584, 10475, 30221, 2912, 27345)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)

lambda <- 1/ mean(t_all)

gf_qq(~t_all, distribution = qexp, dparams = list(rate = lambda),
      title = "Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
      subtitle = "including the first infection event")%>%
gf_qqline(distribution = qexp, dparams = list(rate = lambda))
```

Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution including the first infection event

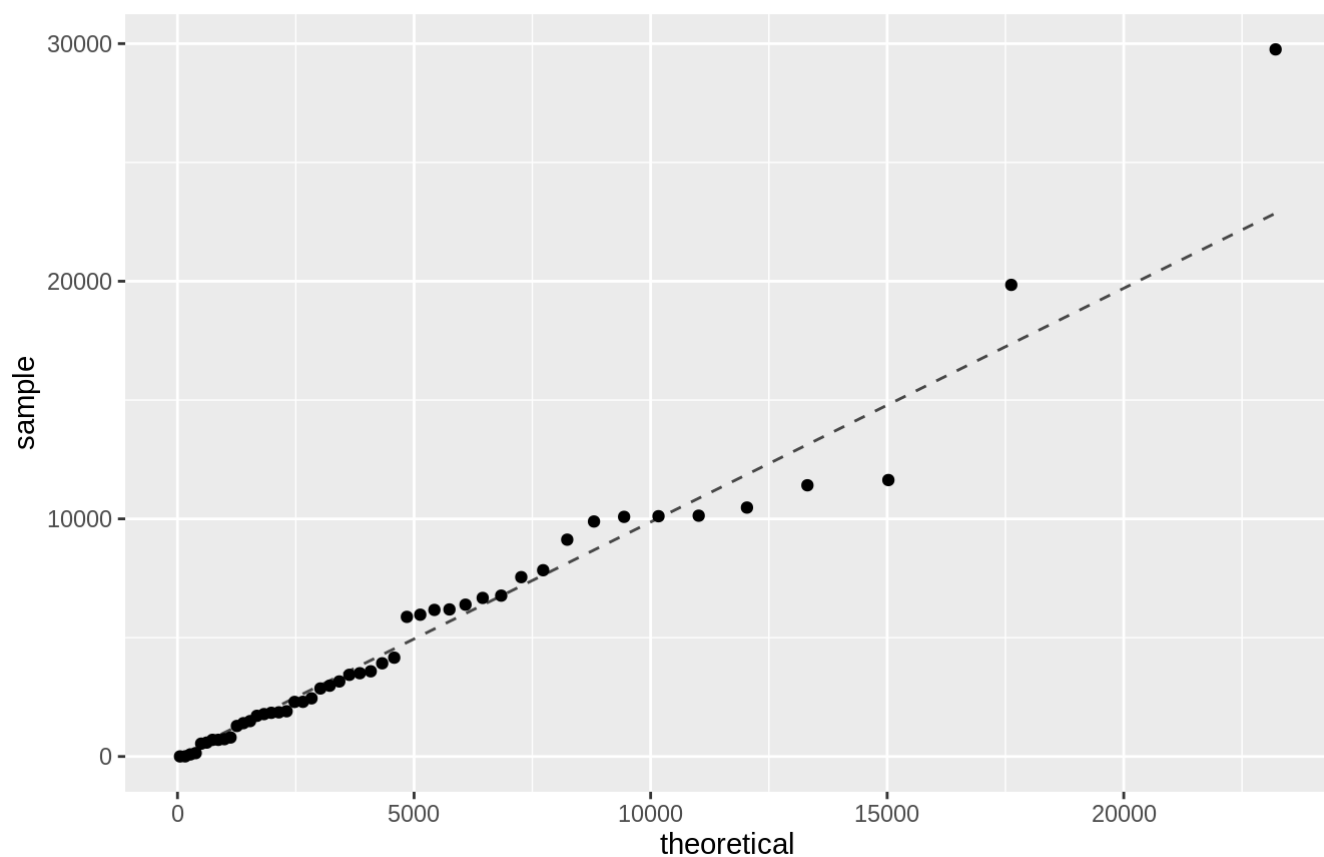


```
# revise
new_t1 <- c(1903, 7838, 6388, 729, 10133, 585, 87, 2296, 11413, 1489, 11633, 10084, 142,
3436, 19847, 5)
new_t2 <- c(5966, 3921, 2446, 6769, 1402, 5875, 1783, 4158, 9124, 540, 2862, 700, 1857,
6188, 10111, 29757)
new_t3 <- c(3504, 7547, 799, 6672, 701, 6168, 2300, 1838, 9889, 2978, 1711, 1284, 3157,
3584, 10475, 3)

new_t_all <- c()
new_t_all <- append(new_t1, new_t2)
new_t_all <- append(new_t_all, new_t3)

qqp(new_t_all, "Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
    "the first and last two infection events removed")
```

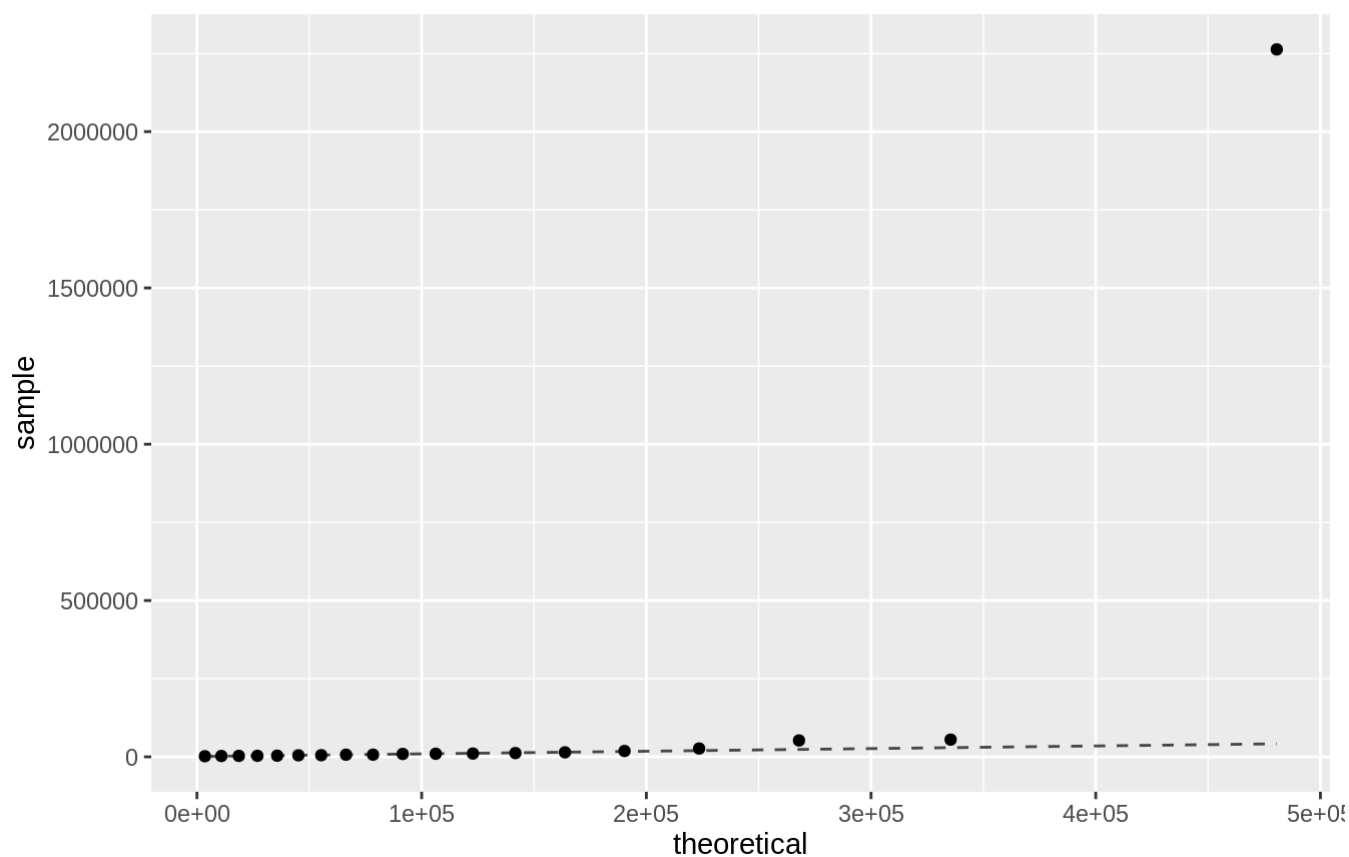
Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution the first and last two infection events removed



```
# dt = 5e-05
t1 <- c(2263086, 6940, 14351, 3049, 12047, 3661, 10447, 6800, 5226, 18684, 4856, 2707, 1
906, 3235, 9938, 26561, 55009, 9211, 52422)

qqp(t1, "Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
      "including the first infection event")
```

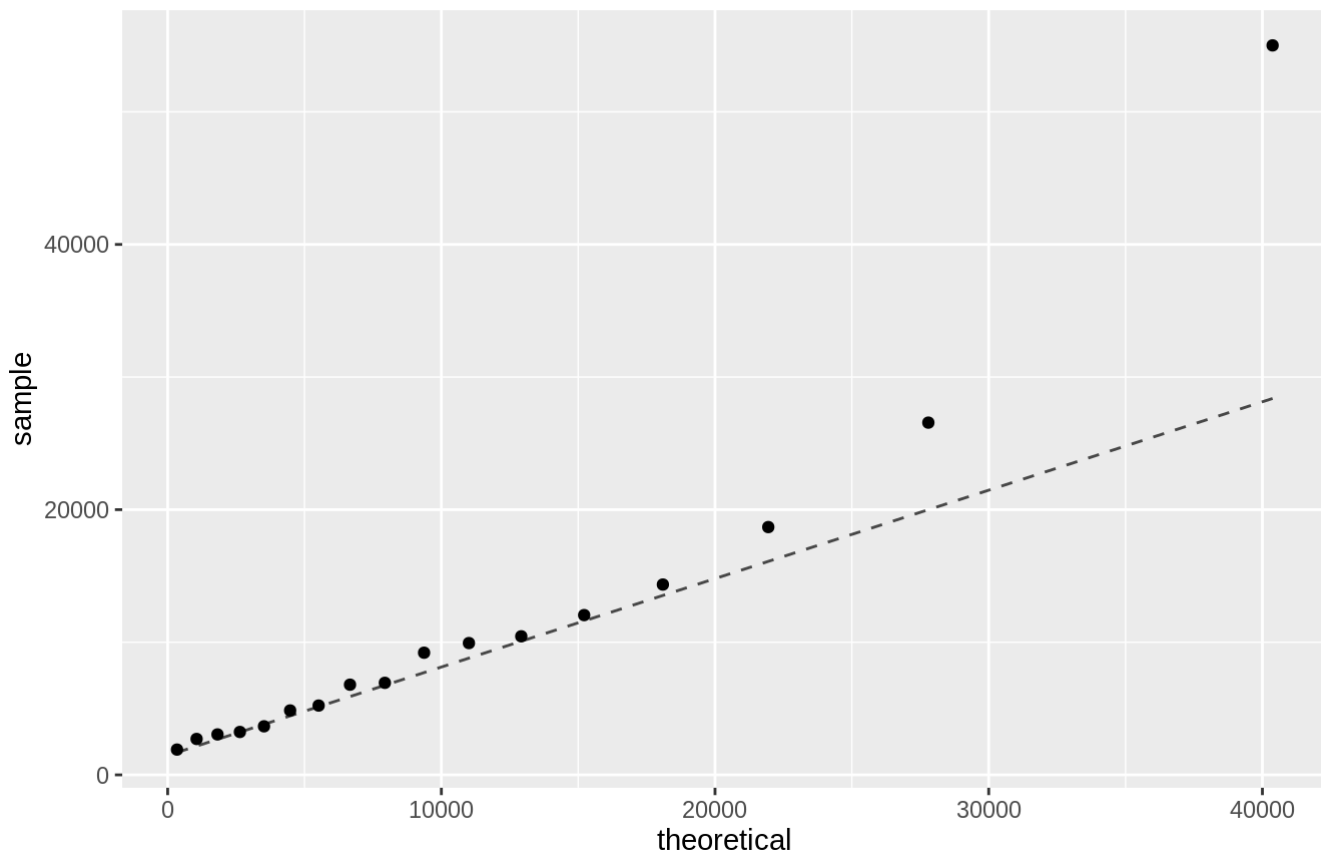
Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution including the first infection event



```
# remove the first
new_t1 <- c(6940, 14351, 3049, 12047, 3661, 10447, 6800, 5226, 18684, 4856, 2707, 1906,
3235, 9938, 26561, 55009, 9211)

qqp(new_t1, "Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution",
      "including the first infection eventthe first and last infection events removed")
```


Asynchronous, Fixed Threshold, Random Graph Waiting Time Distribution including the first infection eventthe first and last infection events removed



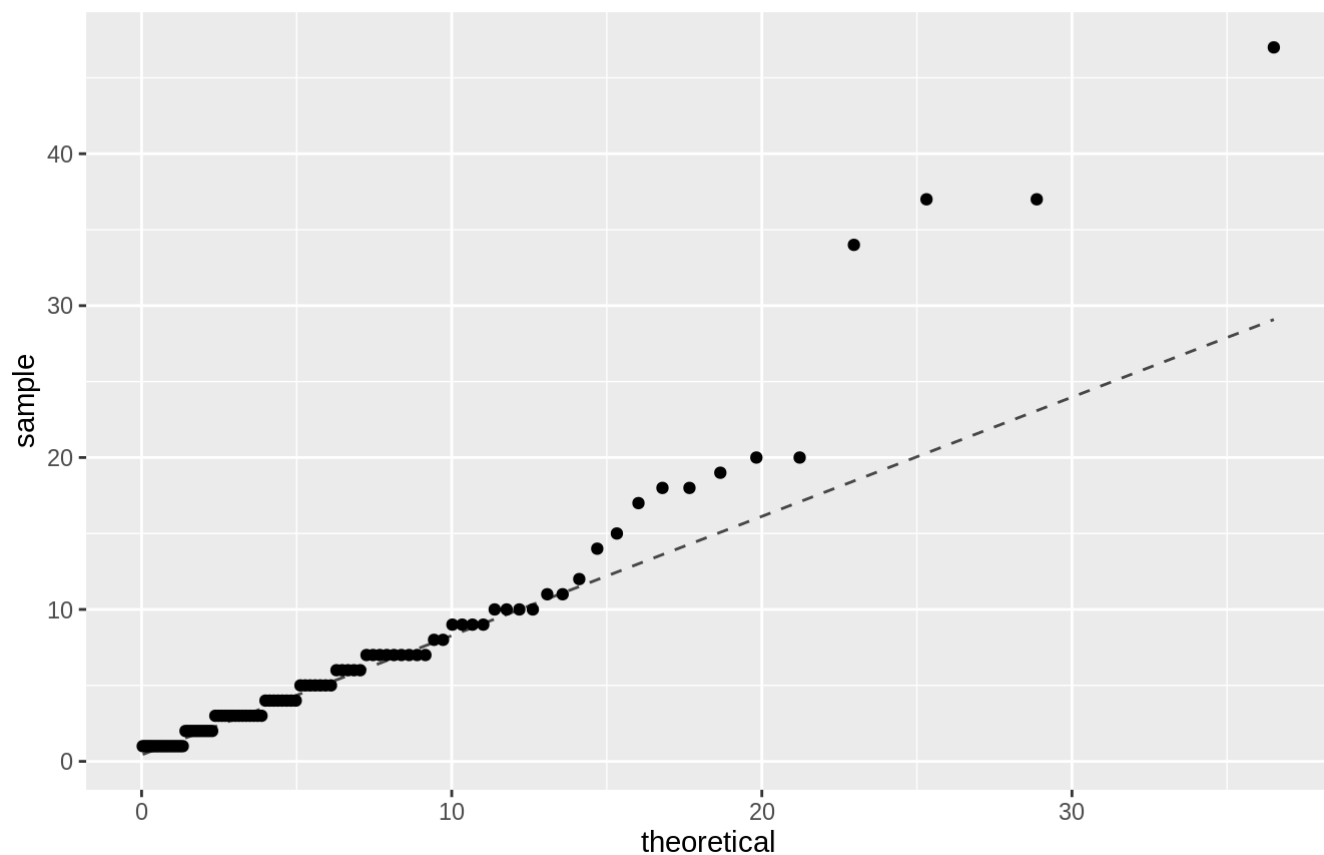
Stochastic Synchronous Flip

```
t1 <- c(37, 9, 5, 3, 9, 8, 1, 2, 4, 3, 10, 1, 5, 7, 3, 1, 17, 6, 1)
t2 <- c(47, 5, 20, 1, 10, 5, 7, 1, 9, 3, 1, 1, 6, 11, 7, 6, 4, 7, 1)
t3 <- c(34, 12, 3, 4, 9, 1, 1, 7, 1, 1, 1, 2, 3, 1, 5, 4, 14, 10, 7)
t4 <- c(20, 1, 18, 18, 1, 2, 3, 2, 5, 4, 3, 3, 2, 7, 5, 6, 4, 6, 19)
t5 <- c(37, 11, 7, 2, 3, 4, 3, 2, 7, 2, 3, 2, 2, 3, 15, 8, 3, 10, 4)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip, Small World Waiting Time Distribution",
     "including the first infection event")
```

Synchronous, Flip, Small World Waiting Time Distribution including the first infection event



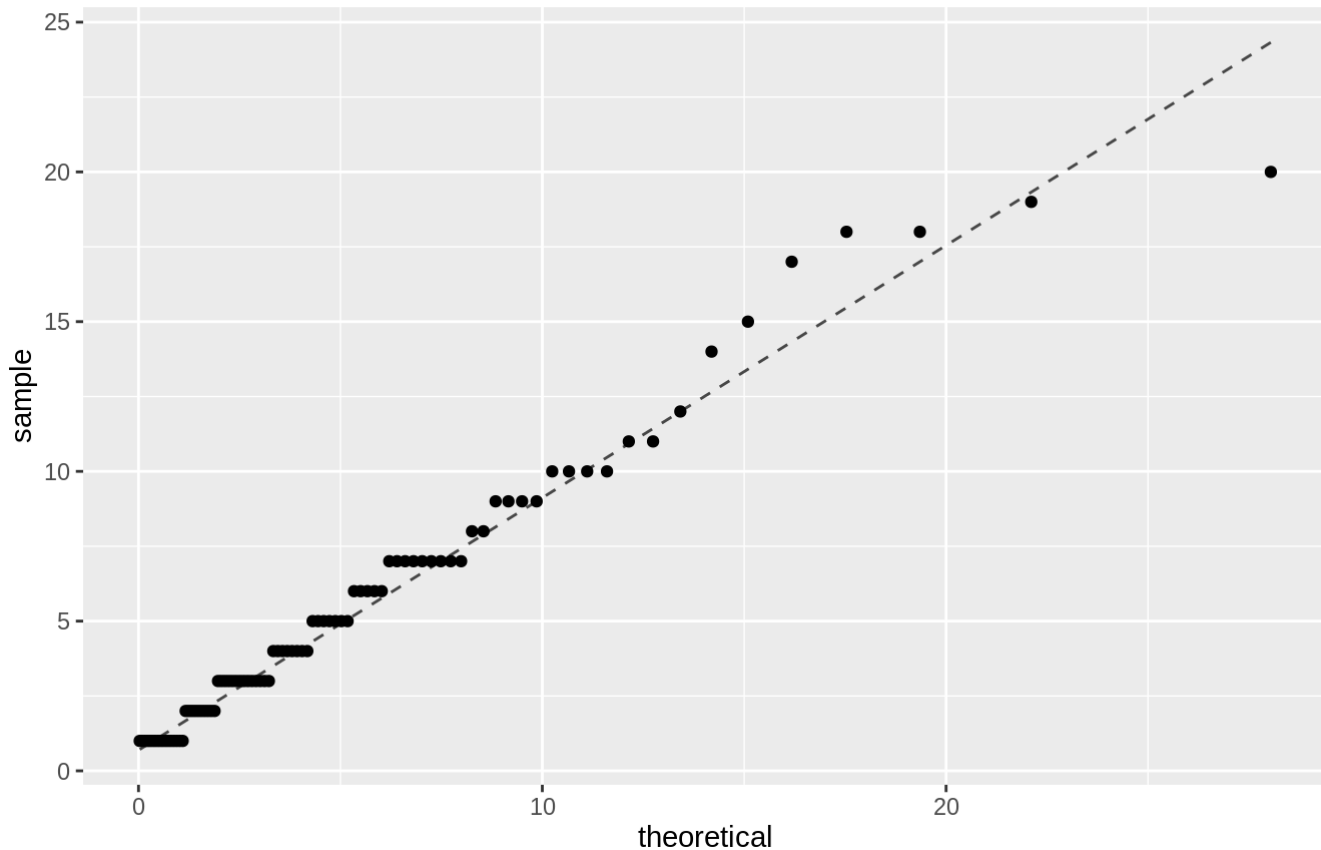
```
# revised
```

```
new_t1 <- c( 9, 5, 3, 9, 8, 1, 2, 4, 3, 10, 1, 5, 7, 3, 1, 17, 6, 1)
new_t2 <- c( 5, 20, 1, 10, 5, 7, 1, 9, 3, 1, 1, 6, 11, 7, 6, 4, 7, 1)
new_t3 <- c( 12, 3, 4, 9, 1, 1, 7, 1, 1, 1, 2, 3, 1, 5, 4, 14, 10, 7)
new_t4 <- c( 1, 18, 18, 1, 2, 3, 2, 5, 4, 3, 3, 2, 7, 5, 6, 4, 6, 19)
new_t5 <- c( 11, 7, 2, 3, 4, 3, 2, 7, 2, 3, 2, 2, 3, 15, 8, 3, 10, 4)
```

```
t_all <- c()
t_all <- append(new_t1, new_t2)
t_all <- append(t_all, new_t3)
t_all <- append(t_all, new_t4)
t_all <- append(t_all, new_t5)
```

```
qqp(t_all, "Synchronous, Flip, Small World Waiting Time Distribution",
     "the first infection event not included")
```

Synchronous, Flip, Small World Waiting Time Distribution the first infection event not included



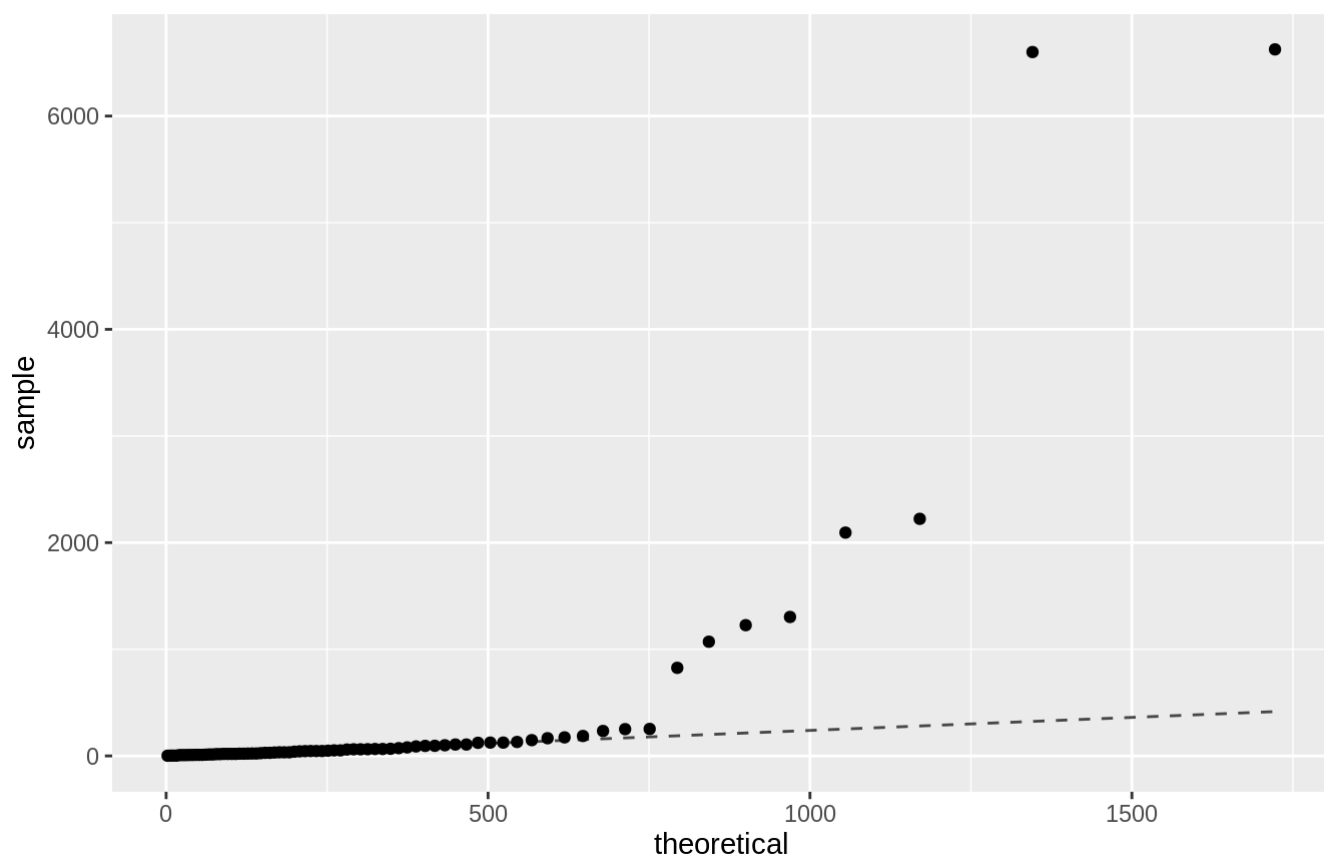
Stochastic Asynchronous Fixed First Quantile

```
t1 <- c(2094, 166, 43, 251, 14, 89, 14, 10, 3, 2, 26, 34, 23, 45, 10, 52, 125, 234, 1303
)
t2 <- c(6625, 73, 187, 3, 17, 94, 22, 62, 46, 10, 52, 12, 19, 19, 32, 21, 131, 62, 1226)
t3 <- c(6600, 253, 100, 80, 17, 8, 67, 9, 40, 8, 65, 8, 19, 46, 60, 34, 125, 174, 826)
t4 <- c(2223, 148, 23, 46, 34, 29, 65, 123, 63, 19, 9, 21, 29, 95, 49, 3, 107, 107, 1071
)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)

qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the First Quantile) including the first infection event")
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the First Quantile) including the first infection event

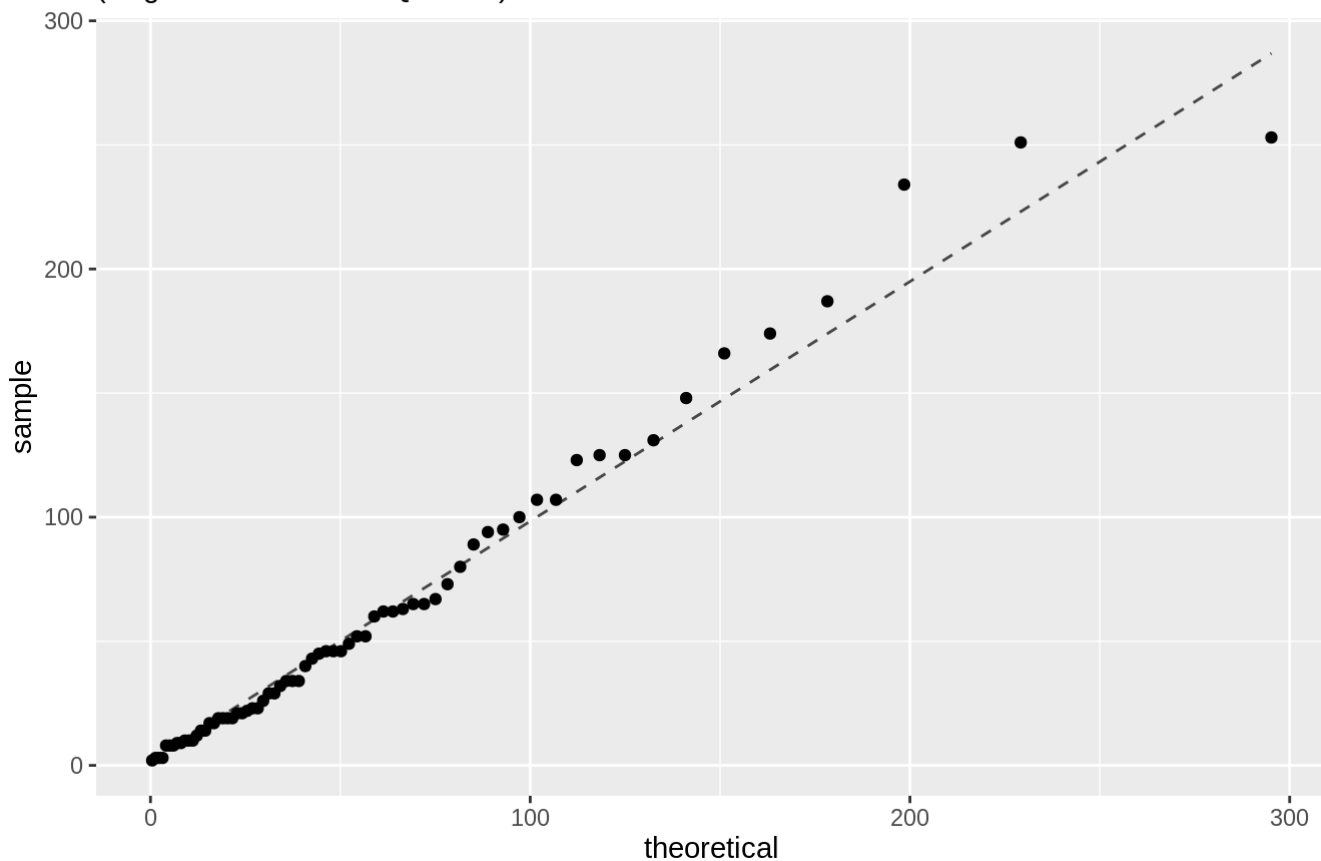


```
# revised
t1 <- c( 166, 43, 251, 14, 89, 14, 10, 3, 2, 26, 34, 23, 45, 10, 52, 125, 234)
t2 <- c( 73, 187, 3, 17, 94, 22, 62, 46, 10, 52, 12, 19, 19, 32, 21, 131, 62)
t3 <- c( 253, 100, 80, 17, 8, 67, 9, 40, 8, 65, 8, 19, 46, 60, 34, 125, 174)
t4 <- c( 148, 23, 46, 34, 29, 65, 123, 63, 19, 9, 21, 29, 95, 49, 3, 107, 107)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)

qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
     "(Degree from the First Quantile) the first and last infection events not included")
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the First Quantile) the first and last infection events not included

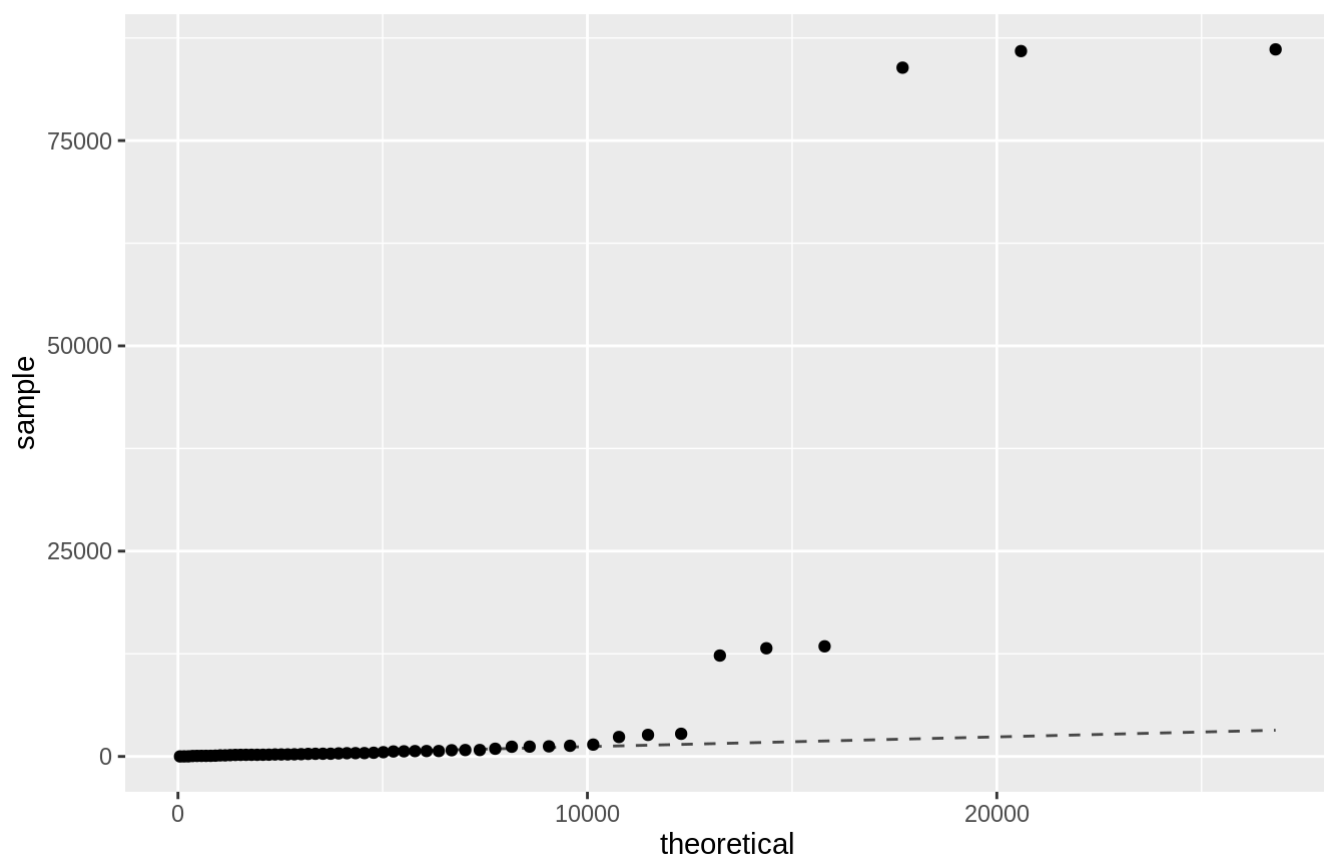


```
t1 <- c(83878, 2368, 1440, 371, 64, 192, 53, 651, 394, 3, 68, 517, 242, 658, 754, 198, 1
30, 1228, 12284)
t2 <- c(86105, 2624, 1297, 240, 308, 71, 94, 328, 605, 7, 321, 330, 214, 780, 407, 623,
660, 12, 13409)
t3 <- c(85897, 2758, 1195, 402, 160, 206, 184, 200, 783, 276, 132, 200, 75, 259, 1181, 4
48, 245, 937, 13173)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)

qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the First Quantile) dt = 0.001, including the first infection event")
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the First Quantile) $dt = 0.001$, including the first infection event



revised

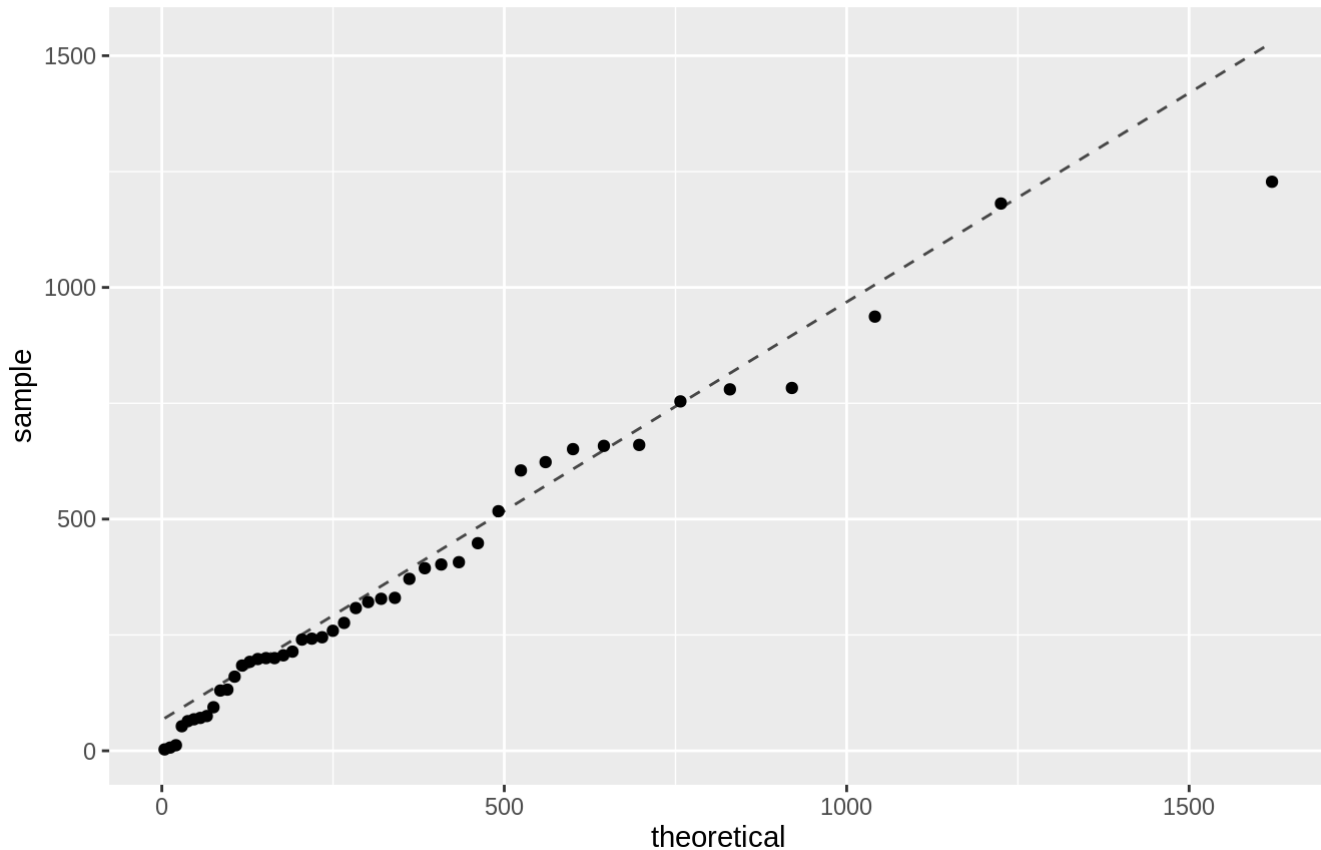
```
t1 <- c( 371, 64, 192, 53, 651, 394, 3, 68, 517, 242, 658, 754, 198, 130, 1228)
t2 <- c( 240, 308, 71, 94, 328, 605, 7, 321, 330, 214, 780, 407, 623, 660, 12)
t3 <- c( 402, 160, 206, 184, 200, 783, 276, 132, 200, 75, 259, 1181, 448, 245, 937)
```

```
t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
```

```
qqp(t_all, "Asynchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the First Quantile)  $dt = 0.001$ , the first three and last infection events not included")
```

Asynchronous, Fixed Threshold, Small World Waiting Time Distribution

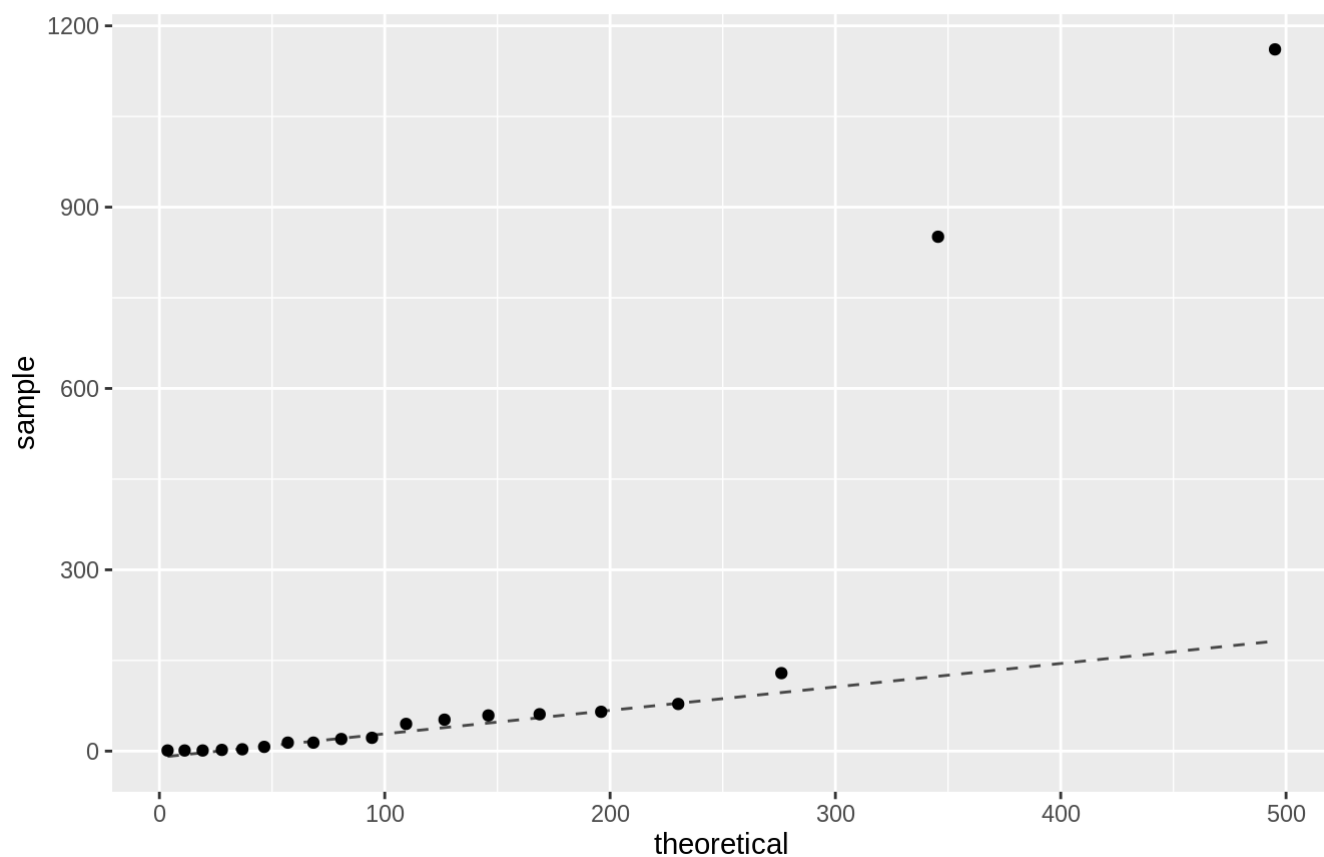
(Degree from the First Quantile) $dt = 0.001$, the first three and last infection events not included



Deterministic Synchronous Fixed First Quantile

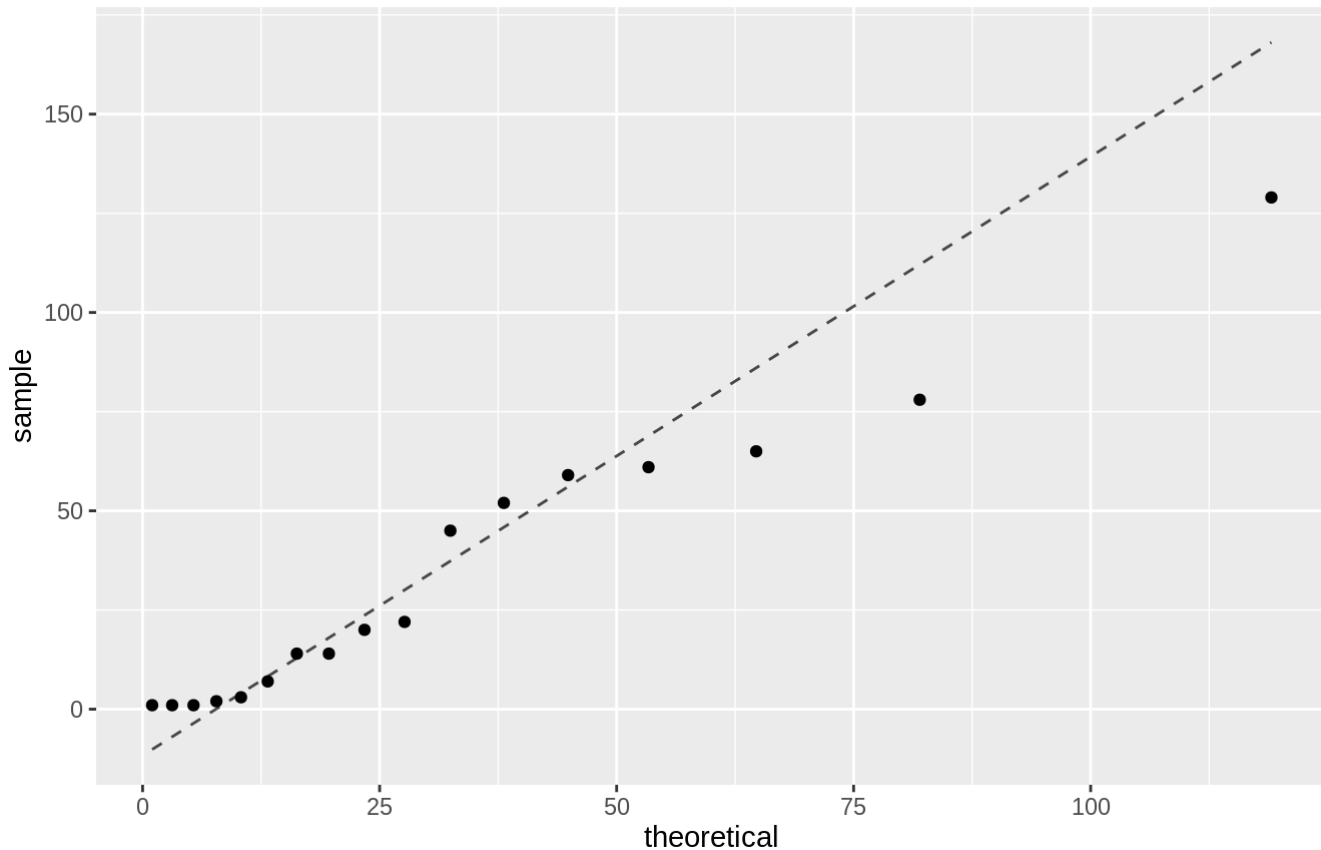
```
t1 <- c(1161, 129, 45, 61, 1, 2, 65, 59, 3, 14, 22, 7, 14, 1, 52, 20, 1, 78, 851)
qqp(t1, "Synchronous, Fixed Threshold, Small World Waiting Time Distribution",
     "(Degree from the First Quantile) including the first infection event")
```

Synchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the First Quantile) including the first infection event



```
# revised
t1 <- c( 129, 45, 61, 1, 2, 65, 59, 3, 14, 22, 7, 14, 1, 52, 20, 1, 78)
qqp(t1, "Synchronous, Fixed Threshold, Small World Waiting Time Distribution",
      "(Degree from the First Quantile) the first and last infection events not included")
```


Synchronous, Fixed Threshold, Small World Waiting Time Distribution (Degree from the First Quantile) the first and last infection events not included



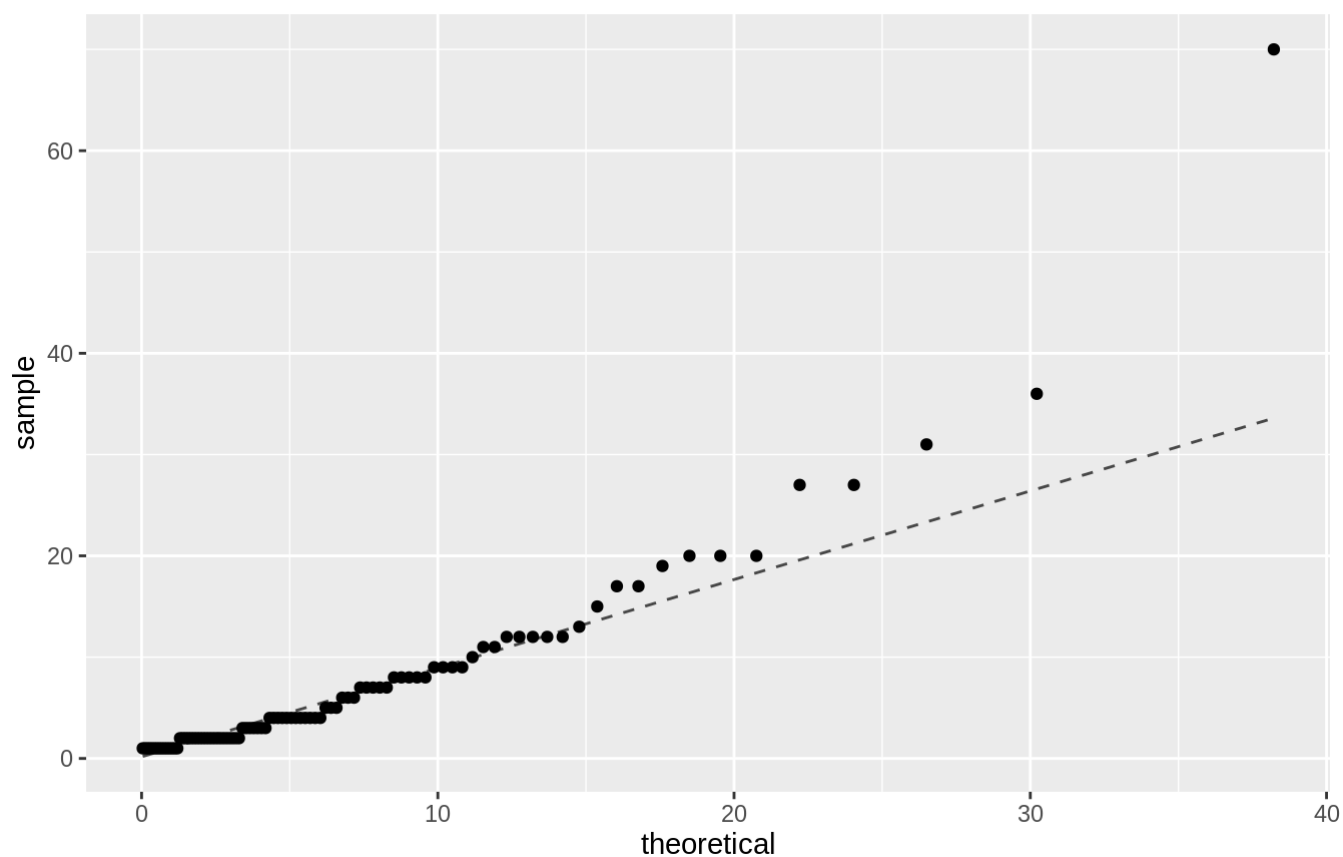
Stochastic Synchronous Flip

```
t1 <- c(70, 8, 2, 4, 3, 8, 10, 1, 3, 1, 4, 2, 3, 2, 1, 2, 1, 3, 8)
t2 <- c(36, 13, 11, 7, 9, 1, 2, 4, 8, 2, 1, 12, 12, 4, 2, 2, 1, 2, 20)
t3 <- c(27, 2, 4, 1, 11, 4, 1, 2, 17, 3, 1, 7, 12, 9, 1, 1, 3, 9, 20)
t4 <- c(27, 17, 12, 2, 4, 19, 1, 4, 2, 4, 1, 5, 15, 2, 2, 6, 7, 2, 7)
t5 <- c(31, 7, 12, 6, 3, 5, 2, 2, 20, 4, 4, 9, 2, 5, 2, 8, 6, 1, 4)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip, Small World Waiting Time Distribution",
     "(First Quantile) including the first infection event")
```

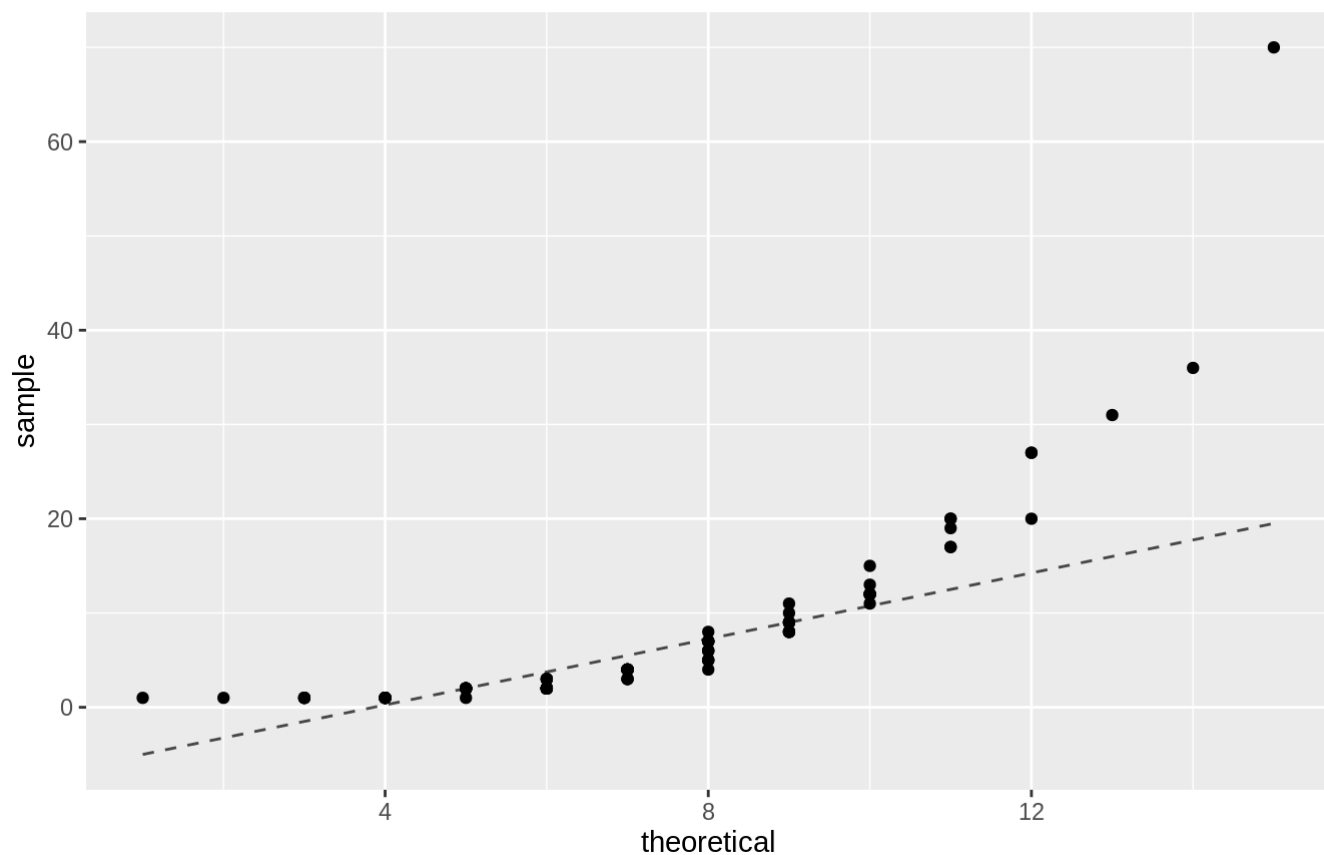
Synchronous, Flip, Small World Waiting Time Distribution (First Quantile) including the first infection event



```
gf_qq(~t_all, distribution = qpois, dparams = list(lambda = mean(t_all)),
      title = "Synchronous, Flip, Small World Waiting Time Distribution (Pois)",
      subtitle = "the first and last two infection removed")%>%
gf_qqline(distribution = qpois, dparams = list(lambda = mean(t_all)))
```

Synchronous, Flip, Small World Waiting Time Distribution (Pois)

the first and last two infection removed

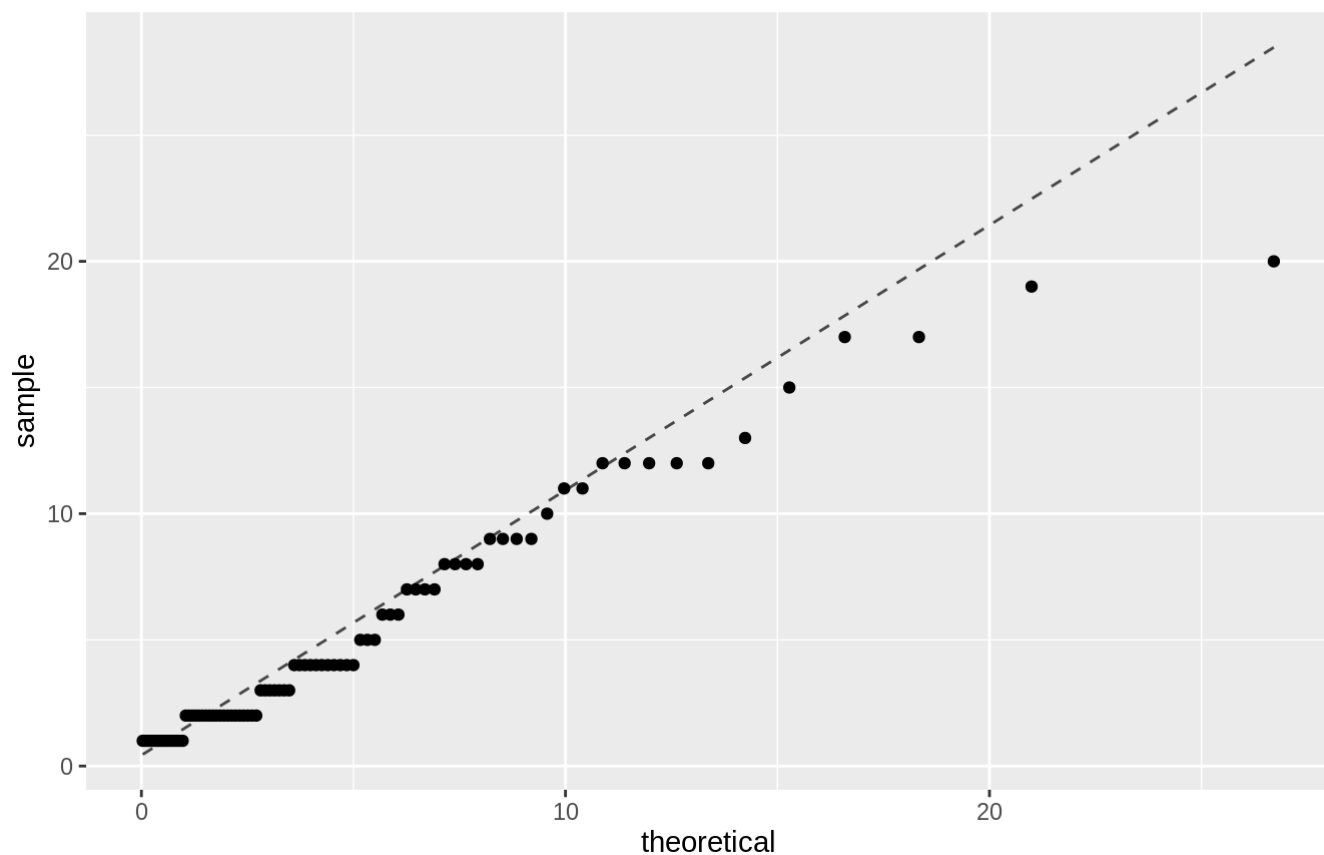


```
# revised
t1 <- c( 8, 2, 4, 3, 8, 10, 1, 3, 1, 4, 2, 3, 2, 1, 2, 1, 3)
t2 <- c( 13, 11, 7, 9, 1, 2, 4, 8, 2, 1, 12, 12, 4, 2, 2, 1, 2)
t3 <- c( 2, 4, 1, 11, 4, 1, 2, 17, 3, 1, 7, 12, 9, 1, 1, 3, 9)
t4 <- c( 17, 12, 2, 4, 19, 1, 4, 2, 4, 1, 5, 15, 2, 2, 6, 7, 2)
t5 <- c( 7, 12, 6, 3, 5, 2, 2, 20, 4, 4, 9, 2, 5, 2, 8, 6, 1)

t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)

qqp(t_all, "Synchronous, Flip, Small World Waiting Time Distribution",
      "(First Quantile) the first and last infection events not included")
```

Synchronous, Flip, Small World Waiting Time Distribution (First Quantile) the first and last infection events not included



```
# revised, poisson
```

```
t_all <- c()
t_all <- append(t1, t2)
t_all <- append(t_all, t3)
t_all <- append(t_all, t4)
t_all <- append(t_all, t5)
gf_qq(~t_all, distribution = qpois, dparams = list(lambda = mean(t_all)),
      title = "Synchronous, Flip, Small World Waiting Time Distribution (Pois)",
      subtitle = "the first and last two infection removed")%>%
gf_qqline(distribution = qpois, dparams = list(lambda = mean(t_all)))
```

Synchronous, Flip, Small World Waiting Time Distribution (Pois) the first and last two infection removed

