

## Question 1.

$\beta := 0.01$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 120.0000015$ $i_{eq} := 439.9999985$ $removed := 440.0000000$ $0.01, 440.0000000$ $\beta := 0.02$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 59.99999941$ $i_{eq} := 470.0000026$ $removed := 469.9999980$ $0.02, 469.9999980$ $\beta := 0.03$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 39.99999950$ $i_{eq} := 480.0000032$ $removed := 479.9999973$ $0.03, 479.9999973$ $\beta := 0.04$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 29.99999959$ $i_{eq} := 485.0000036$ $removed := 484.9999968$	$\beta := 0.05$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 23.99999964$ $i_{eq} := 488.0000034$ $removed := 487.9999970$ $0.05, 487.9999970$ $\beta := 0.06$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 19.99999971$ $i_{eq} := 490.0000034$ $removed := 489.9999969$ $0.06, 489.9999969$ $\beta := 0.07$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 17.14285716$ $i_{eq} := 491.4285710$ $removed := 491.4285718$ $0.07, 491.4285718$ $\beta := 0.08$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 14.99999978$ $i_{eq} := 492.5000035$ $removed := 492.4999967$ $0.08, 492.4999967$	$\beta := 0.09$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 13.33333314$ $i_{eq} := 493.3333369$ $removed := 493.3333300$ $0.09, 493.3333300$ $\beta := 0.10$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 11.99999983$ $i_{eq} := 494.0000035$ $removed := 493.9999967$ $0.10, 493.9999967$ $\beta := 0.11$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 10.90909092$ $i_{eq} := 494.5454544$ $removed := 494.5454547$ $0.11, 494.5454547$ $\beta := 0.12$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 9.999999844$ $i_{eq} := 495.0000038$ $removed := 494.9999964$ $0.12, 494.9999964$
$\beta := 0.13$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 9.230769134$ $i_{eq} := 495.3846180$ $removed := 495.3846129$ $0.13, 495.3846129$ $\beta := 0.14$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 8.571428511$ $i_{eq} := 495.7142874$ $removed := 495.7142841$ $0.14, 495.7142841$ $\beta := 0.15$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 7.999999872$ $i_{eq} := 496.0000040$ $removed := 495.9999961$ $0.15, 495.9999961$ $\beta := 0.16$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 7.499999882$ $i_{eq} := 496.2500040$ $removed := 496.2499961$ $0.16, 496.2499961$	$\beta := 0.17$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 7.058823513$ $i_{eq} := 496.4705889$ $removed := 496.4705876$ $0.17, 496.4705876$ $\beta := 0.18$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 6.666666563$ $i_{eq} := 496.6666706$ $removed := 496.6666628$ $0.18, 496.6666628$ $\beta := 0.19$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 6.315789458$ $i_{eq} := 496.8421060$ $removed := 496.8421045$ $0.19, 496.8421045$ $\beta := 0.20$ <i>[Length of output exceeds limit of 1000000]</i> $s_{eq} := 5.999999902$ $i_{eq} := 497.0000040$ $removed := 496.9999961$ $0.20, 496.9999961$	

## Question 2

Out of the 20 trials I got 20 stable equilibrium

```
count := 0;
for trial from 1 to 20 do
  a1 := rand(1..100());
  a2 := rand(1..100());
  result := SEquP(ChemoStat(N,C,a1,a2), [N,C]);
```

```
if nops(result) > 0 then
```

```

        count := count + 1;
    fi;
od;

print(cat("Number of stable equilibria: ", count, " out of 20"));

```

### Question 3

```

> SIRSdemo(1000, 400, 1, 1, 0.01, 10);
This is a numerical demonstration of the R0 phenomenon in the SIRS model using discretization with mesh size=, 0.01,
and letting it run until time t=, 10
with population size, 1000, and fixed parameters nu=, 1, and gamma=, 1

```

### Question 4:

The numbers are indeed very close, like within 0.07 for the range around 0.55  
 With the average being 0.55