

Question 1.

$\beta := 0.01$	$\beta := 0.05$	$\beta := 0.09$
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>
$s_{eq} := 120.0000015$	$s_{eq} := 23.9999964$	$s_{eq} := 13.33333314$
$i_{eq} := 439.999985$	$i_{eq} := 488.0000034$	$i_{eq} := 493.3333369$
$removed := 440.0000000$	$removed := 487.9999970$	$removed := 493.3333300$
$0.01, 440.0000000$	$0.05, 487.9999970$	$0.09, 493.3333300$
$\beta := 0.02$	$\beta := 0.06$	$\beta := 0.10$
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>
$s_{eq} := 59.9999941$	$s_{eq} := 19.9999971$	$s_{eq} := 11.9999983$
$i_{eq} := 470.0000026$	$i_{eq} := 490.0000034$	$i_{eq} := 494.0000035$
$removed := 469.999980$	$removed := 489.9999969$	$removed := 493.9999967$
$0.02, 469.999980$	$0.06, 489.9999969$	$0.10, 493.9999967$
$\beta := 0.03$	$\beta := 0.07$	$\beta := 0.11$
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>
$s_{eq} := 39.9999950$	$s_{eq} := 17.14285716$	$s_{eq} := 10.90909092$
$i_{eq} := 480.0000032$	$i_{eq} := 491.4285710$	$i_{eq} := 494.5454544$
$removed := 479.999973$	$removed := 491.4285718$	$removed := 494.5454547$
$0.03, 479.999973$	$0.07, 491.4285718$	$0.11, 494.5454547$
$\beta := 0.04$	$\beta := 0.08$	$\beta := 0.12$
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>
$s_{eq} := 29.9999959$	$s_{eq} := 14.9999978$	$s_{eq} := 9.99999844$
$i_{eq} := 485.0000036$	$i_{eq} := 492.5000035$	$i_{eq} := 495.0000038$
$removed := 484.999968$	$removed := 492.4999967$	$removed := 494.9999964$
$0.04, 484.999968$	$0.08, 492.4999967$	$0.12, 494.9999964$
$\beta := 0.13$	$\beta := 0.17$	
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	
$s_{eq} := 9.230769134$	$s_{eq} := 7.058823513$	
$i_{eq} := 495.3846180$	$i_{eq} := 496.4705889$	
$removed := 495.3846129$	$removed := 496.4705876$	
$0.13, 495.3846129$	$0.17, 496.4705876$	
$\beta := 0.14$	$\beta := 0.18$	
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	
$s_{eq} := 8.571428511$	$s_{eq} := 6.666666563$	
$i_{eq} := 495.7142874$	$i_{eq} := 496.6666706$	
$removed := 495.7142841$	$removed := 496.6666628$	
$0.14, 495.7142841$	$0.18, 496.6666628$	
$\beta := 0.15$	$\beta := 0.19$	
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	
$s_{eq} := 7.999999872$	$s_{eq} := 6.315789458$	
$i_{eq} := 496.0000040$	$i_{eq} := 496.8421060$	
$removed := 495.9999961$	$removed := 496.8421045$	
$0.15, 495.9999961$	$0.19, 496.8421045$	
$\beta := 0.16$	$\beta := 0.20$	
<i>[Length of output exceeds limit of 1000000]</i>	<i>[Length of output exceeds limit of 1000000]</i>	
$s_{eq} := 7.499999882$	$s_{eq} := 5.999999902$	
$i_{eq} := 496.2500040$	$i_{eq} := 497.0000040$	
$removed := 496.2499961$	$removed := 496.9999961$	
$0.16, 496.2499961$	$0.20, 496.9999961$	

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

```
> SIRScdemo(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