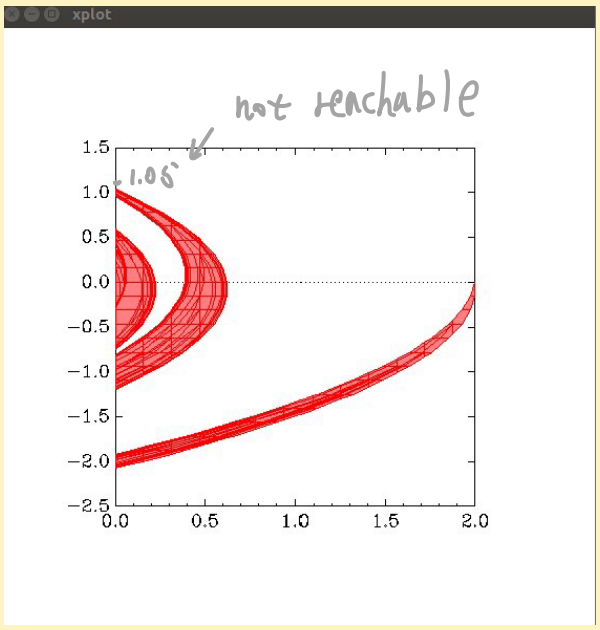
Lab3. Junfei Wang 33006896

Part B.

1. 86 locations are reached

2. a.



b.

```
// add commands here to check reachable states
cond1=bouncing_ball.{falling & v>=1.05};
check1=bouncing_ball.is_reachable(cond1);
```

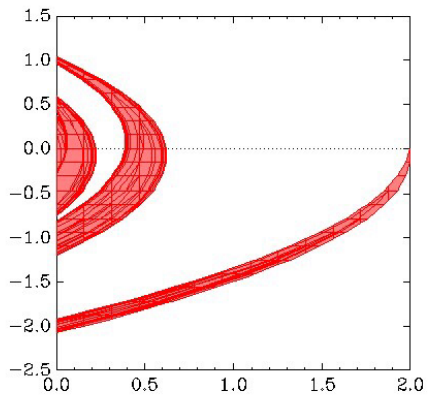
the text output consistent with my visual inspection.

3.

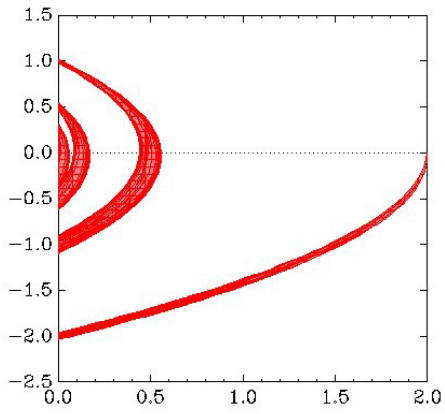
Partition Constraint for C	Condition reachable?	V < 1.05 Proved?	Num Locations reached	CPU Time (sec)
1	reachable	no	18	2
0.8	reachable	no	18	2
0.4	reachable	no	41	5
0.3	not reachable	Yes	86	9
0.25	not reachable	Yes	86	9
0.2	not reachable	Yes	86	10
0.15	not reachable	Yes	190	20
0.1	not reachable	Yes	190	20
0.01	not reachable	Yes	1588	320
0.001	not reachable	Yes		timed out

4.

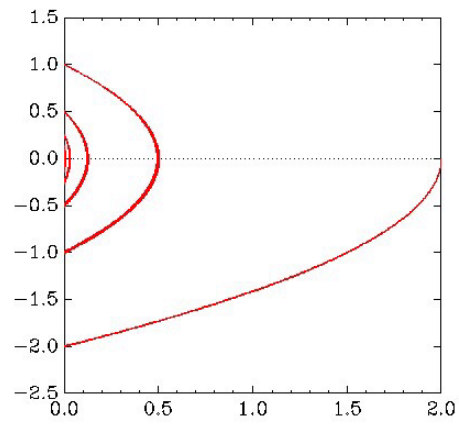
pc = 0.25



pc = 0.15



pc = 0.01



a. pc = 1

b. pc = 0.001

c. pc = 0.001

d. pc = 0.3 a trade-off between model abstraction and cpu time.

e. cond1 = bouncing_ball.{falling && v >= 1.2};

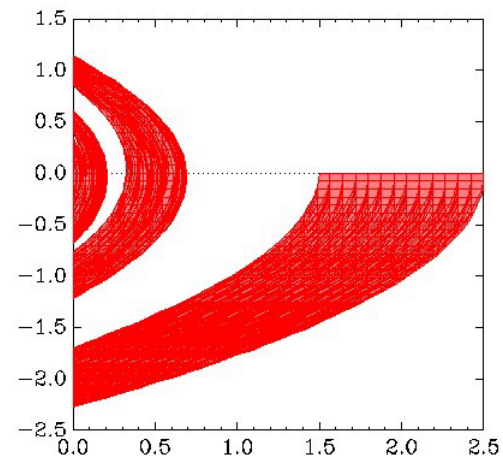
check1 = bouncing_ball.is_reachable(cond1);

f.

Partition pc	Constraint	Condition reachable?
1		cannot determined
0.8		cannot determined
0.4		not reachable
0.3		not reachable
0.25		not reachable
0.2		not reachable
0.15		not reachable
0.1		not reachable
0.01		not reachable
0.001		not reachable

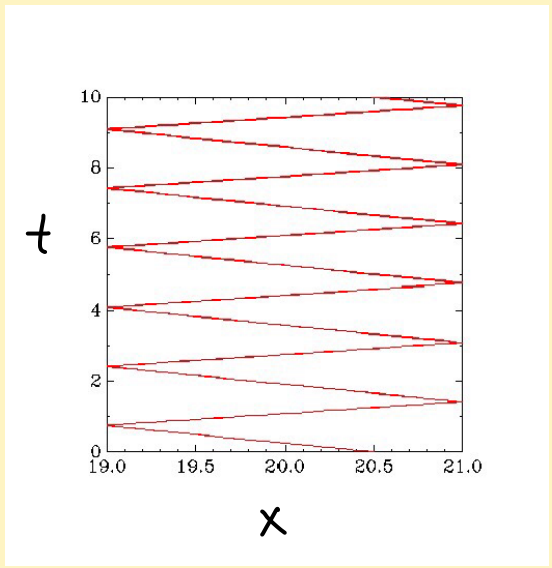
5.

pc = 0.1



Part C.

1. 584 locations are reachable.



loc cool: while $t <= 10$ & $x >= 19$ & $x <= 21$

loc heat: while $t <= 10$ & $x >= 19$ & $x <= 21$

the invariant should be $19 \leq x \leq 21$, then the system will transit as soon as it is allowed by the guard condition.

2.

Partition pc	Constraint	Condition reachable?
1.2		not reachable
1.6		not reachable
2		reachable
1.7		not reachable
1.8		not reachable
1.9		not reachable

∴ the largest value of pc for the condition is 1.9.