

Sample Questions for CDS Research Interviews

May 17, 2019

1 CD-CP

1. Sketch the graph $y = \sin(x)$ for all real x .
2. Rewrite the following algorithm using only two 'for' loops instead of the four used, such that the computed outputs do not change.

```
...
for  $i=1$  to  $N$  do
  for  $j=1$  to  $N$  do
     $A[i][j] = u[i] * v[j]$ 
for  $i=1$  to  $N$  do
  for  $j=1$  to  $N$  do
     $b[i] = b[i] + A[i][j] * x[j]$ 
  Output " $b[i]$ "
```

3. You are told that among the people in a room, 15 are unmarried and 19 of them do not have red hair. Also, 7 of them are married and have red hair. Given this data, the minimum and maximum possible number of people in the room are?
4. Evaluate the limit $\lim_{x \rightarrow 0} \frac{1}{1 + \sin(x)}$