In [ ]:
```
import networkx as nx
import numpy as np
import random
from matplotlib import pyplot as plt
random.seed()
```

In [ ]:
```
# n = 1000000
# c = 2m/n = 2log2
# m = nc/2 = nlog2 = 100*log2
G = nx.Graph()
```

We want to create a network of n nodes (one million). This is fixed. Given this network, from the constraint on the mean degree produce, we know how many total edges we need. So we just need to randomlt allocate these edges (could do while loop)

In [ ]:
```
# start with 100 nodes only
n = 100
iter = 0
while iter <= n:
    print(iter)
    name = 'Node_' + str(iter)
    print(name)
    G.add_node(name)
    iter += 1
```

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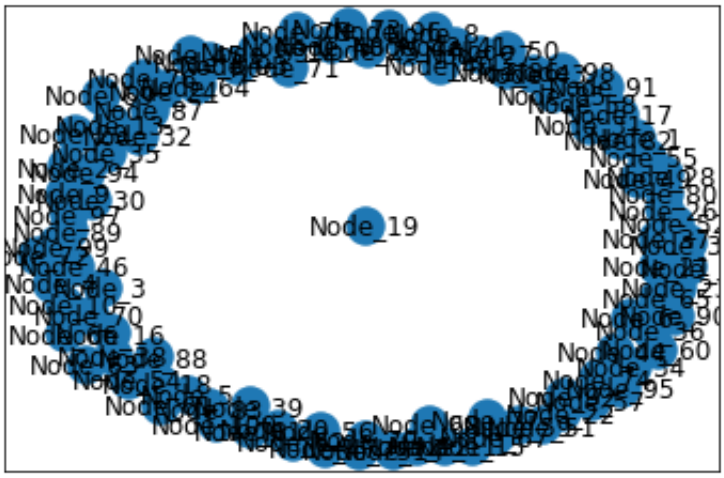
Node_99
100
Node_100
```

In [ ]:
```
# print the graph that has no edges
nx.draw_networkx(G)
```



In [ ]:
```
tot_egdes = n * np.log(2)
print(tot_egdes)
```

```
69.31471805599453
```

In [ ]:
```
# randomly add 69 edges
iter = 0
while iter < tot_egdes:
    print(iter)
    node1 = "Node_" + str(random.randint(0, n))
    node2 = "Node_" + str(random.randint(0, n))
    if not G.has_edge(node1,node2):
        G.add_edge(node1,node2)
        iter += 1
```

```
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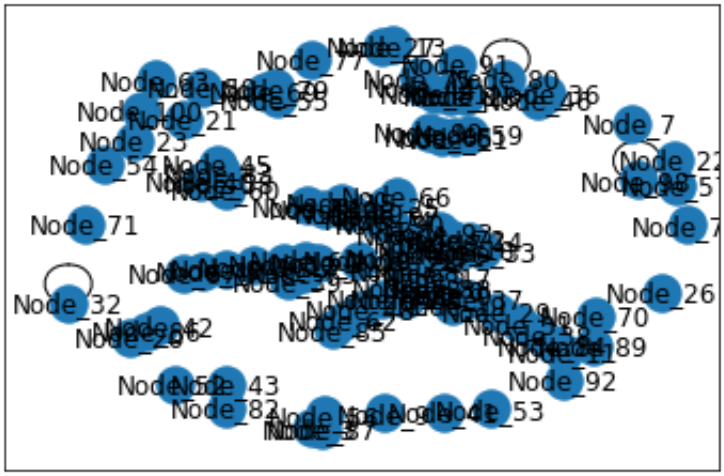
```

In [ ]:
```
nx.draw_networkx(G)
```



In [ ]:
```
degrees = [val for (node, val) in G.degree()]

sum_of_edges = sum(degrees)
avg_degree = sum_of_edges / tot_egdes

print(2*np.log(2))
print(avg_degree)
```

```
1.3862943611198906
2.019773057244549
```

In [ ]:
```
Gcc = sorted(nx.connected_components(G), key=len, reverse=True)
G0 = G.subgraph(Gcc[0])
```

In [ ]:
```
print("full network node count is " + str(G.number_of_nodes()))
print("largest compent node count is " + str(G0.number_of_nodes()))
nx.draw_networkx(G0)
plt.show()
```

```
full network node count is 101
largest compent node count is 48
```