

# Test

July 1, 2022

```
[102]: from qiskit import *
from qiskit.visualization import plot_bloch_multivector, plot_histogram
from qiskit.aqua.algorithms import Shor
from qiskit.aqua import QuantumInstance
import numpy as np
from qiskit import IBMQ
from qiskit.tools.visualization import plot_histogram
from qiskit.tools.monitor import job_monitor
IBMQ.
    ↪save_account('35b928a34f3c82fef0cb27f5a76e0b2c660e7ff461551308a1f597918a22843fd99465440401c
IBMQ.load_account()
largelist = []
shortlist = []
```

```
configrc.store_credentials:WARNING:2022-07-01 19:16:51,401: Credentials already
present. Set overwrite=True to overwrite.
ibmqfactory.load_account:WARNING:2022-07-01 19:16:53,306: Credentials are
already in use. The existing account in the session will be replaced.
```

```
[103]: qc = QuantumCircuit(1, 1) #1 quantum, 1 classical
%matplotlib inline
qc.draw(output='mpl')
```

[103]:

$q$  —  
 $c \stackrel{1}{=}$

```
[104]: qc.h(0)
qc.z(0)
qc.h(0)
```

```
qc.draw(output='mpl')
```

[104]:



```
[105]: for i in range(40):
        qc.measure(0, 0)
        provider = IBMQ.get_provider('ibm-q')
        backend = provider.get_backend('ibmq_armonk')
        job = execute(qc, backend=backend)
        job_monitor(job)
        result = job.result()
        largelist.append(result.time_taken)
        print(result.time_taken)
        print(largelist)
```

Job Status: job has successfully run

21.29627752304077

[21.29627752304077]

Job Status: job has successfully run

21.392746448516846

[21.29627752304077, 21.392746448516846]

Job Status: job has successfully run

21.382200479507446

[21.29627752304077, 21.392746448516846, 21.382200479507446]

Job Status: job has successfully run

21.30118203163147

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147]

Job Status: job has successfully run

21.335225343704224

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224]

Job Status: job has successfully run

21.385164260864258

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258]

Job Status: job has successfully run

21.393146514892578

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578]  
 Job Status: job has successfully run  
 21.31537127494812

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812]  
 Job Status: job has successfully run  
 21.48387622833252

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252]  
 Job Status: job has successfully run  
 21.45887017250061

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061]  
 Job Status: job has successfully run  
 21.436885118484497

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497]  
 Job Status: job has successfully run  
 21.477598905563354

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354]  
 Job Status: job has successfully run  
 21.479353427886963

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963]  
 Job Status: job has successfully run  
 21.37249779701233

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233]  
 Job Status: job has successfully run  
 21.321516513824463

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463]  
 Job Status: job has successfully run  
 21.367279291152954

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812,

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Job Status: job has successfully run

21.394789457321167

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167]

Job Status: job has successfully run

21.301188230514526

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526]

Job Status: job has successfully run

21.36976933479309

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309]

Job Status: job has successfully run

21.4064998626709

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709]

Job Status: job has successfully run

21.365564584732056

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056]

Job Status: job has successfully run

21.401605367660522

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522]

Job Status: job has successfully run

21.351768255233765

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765]

Job Status: job has successfully run

21.365818977355957

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957]

Job Status: job has successfully run

21.404240608215332

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Job Status: job has successfully run

21.44085693359375

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957, 21.404240608215332, 21.44085693359375]

Job Status: job has successfully run

21.40129280090332

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957, 21.404240608215332, 21.44085693359375, 21.40129280090332]

Job Status: job has successfully run

21.48178267478943

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709,

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21.404240608215332, 21.44085693359375, 21.40129280090332, 21.48178267478943]

Job Status: job has successfully run

21.525347471237183

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147,  
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21.404240608215332, 21.44085693359375, 21.40129280090332, 21.48178267478943,  
21.525347471237183]

Job Status: job has successfully run

22.161521196365356

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147,  
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21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354,  
21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954,  
21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709,  
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21.404240608215332, 21.44085693359375, 21.40129280090332, 21.48178267478943,  
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Job Status: job has successfully run

21.402080059051514

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147,  
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21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354,  
21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954,  
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21.525347471237183, 22.161521196365356, 21.402080059051514]

Job Status: job has successfully run

21.380948543548584

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147,  
21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812,  
21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354,  
21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954,  
21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709,  
21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957,  
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21.525347471237183, 22.161521196365356, 21.402080059051514, 21.380948543548584]

Job Status: job has successfully run

21.36337924003601

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21.36337924003601]

Job Status: job has successfully run

21.385392427444458

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21.36337924003601, 21.385392427444458]

Job Status: job has successfully run

21.405882120132446

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21.36337924003601, 21.385392427444458, 21.405882120132446]

Job Status: job has successfully run

21.348557949066162

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147,  
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21.525347471237183, 22.161521196365356, 21.402080059051514, 21.380948543548584,  
21.36337924003601, 21.385392427444458, 21.405882120132446, 21.348557949066162]

Job Status: job has successfully run

21.364990711212158

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147,  
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21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354,  
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21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709,  
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Job Status: job has successfully run

21.37385082244873

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957, 21.404240608215332, 21.44085693359375, 21.40129280090332, 21.48178267478943, 21.525347471237183, 22.161521196365356, 21.402080059051514, 21.380948543548584, 21.36337924003601, 21.385392427444458, 21.405882120132446, 21.348557949066162, 21.364990711212158, 21.37385082244873]

Job Status: job has successfully run

21.372731924057007

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957, 21.404240608215332, 21.44085693359375, 21.40129280090332, 21.48178267478943, 21.525347471237183, 22.161521196365356, 21.402080059051514, 21.380948543548584, 21.36337924003601, 21.385392427444458, 21.405882120132446, 21.348557949066162, 21.364990711212158, 21.37385082244873, 21.372731924057007]

Job Status: job has successfully run

21.322350025177002

[21.29627752304077, 21.392746448516846, 21.382200479507446, 21.30118203163147, 21.335225343704224, 21.385164260864258, 21.393146514892578, 21.31537127494812, 21.48387622833252, 21.45887017250061, 21.436885118484497, 21.477598905563354, 21.479353427886963, 21.37249779701233, 21.321516513824463, 21.367279291152954, 21.394789457321167, 21.301188230514526, 21.36976933479309, 21.4064998626709, 21.365564584732056, 21.401605367660522, 21.351768255233765, 21.365818977355957, 21.404240608215332, 21.44085693359375, 21.40129280090332, 21.48178267478943, 21.525347471237183, 22.161521196365356, 21.402080059051514, 21.380948543548584, 21.36337924003601, 21.385392427444458, 21.405882120132446, 21.348557949066162, 21.364990711212158, 21.37385082244873, 21.372731924057007, 21.322350025177002]

[ ]:

[ ]:

```
[106]: qc = QuantumCircuit(1, 1) #1 quantum, 1 classical
      %matplotlib inline
      qc.draw(output='mpl')
```


[106]:



$q$  —  
 $c \frac{1}{\neq}$

```
[107]: qc.x(0)
       qc.draw(output='mpl')
```

[107]:

$q$  —  —  
 $c \frac{1}{\neq}$

```
[108]: for i in range(40):
       qc.measure(0, 0)
       provider = IBMQ.get_provider('ibm-q')
       backend = provider.get_backend('ibmq_armonk')
       job = execute(qc, backend=backend)
       job_monitor(job)
       result = job.result()
       shortlist.append(result.time_taken)
       print(result.time_taken)
       print(shortlist)
```

Job Status: job has successfully run

21.38860321044922

[21.38860321044922]

Job Status: job has successfully run

21.39008092880249

[21.38860321044922, 21.39008092880249]

Job Status: job has successfully run

21.278805017471313

[21.38860321044922, 21.39008092880249, 21.278805017471313]

Job Status: job has successfully run  
21.375648021697998  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998]  
Job Status: job has successfully run  
21.30289578437805  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805]  
Job Status: job has successfully run  
21.38517928123474  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474]  
Job Status: job has successfully run  
21.357381343841553  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553]  
Job Status: job has successfully run  
21.36675477027893  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893]  
Job Status: job has successfully run  
21.37654972076416  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893, 21.37654972076416]  
Job Status: job has successfully run  
21.523606538772583  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893, 21.37654972076416, 21.523606538772583]  
Job Status: job has successfully run  
21.371176958084106  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893, 21.37654972076416, 21.523606538772583, 21.371176958084106]  
Job Status: job has successfully run  
21.479830503463745  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893, 21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745]  
Job Status: job has successfully run  
21.32796287536621  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998, 21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893, 21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745, 21.32796287536621]  
Job Status: job has successfully run  
21.38793444633484  
[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,

21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484]

Job Status: job has successfully run

21.331576347351074

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074]

Job Status: job has successfully run

21.31588625907898

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898]

Job Status: job has successfully run

21.418308973312378

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378]

Job Status: job has successfully run

21.314120531082153

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153]

Job Status: job has successfully run

21.349019765853882

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882]

Job Status: job has successfully run

21.36039972305298

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298]

Job Status: job has successfully run

21.319838047027588

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,

21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588]

Job Status: job has successfully run

21.371932983398438

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438]

Job Status: job has successfully run

21.3367440700531

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531]

Job Status: job has successfully run

21.478978395462036

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036]

Job Status: job has successfully run

21.383166074752808

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808]

Job Status: job has successfully run

21.302529335021973

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973]

Job Status: job has successfully run

21.334707975387573

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,

21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573]

Job Status: job has successfully run

21.416112184524536

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536]

Job Status: job has successfully run

21.284027338027954

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536,  
21.284027338027954]

Job Status: job has successfully run

21.42008113861084

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536,  
21.284027338027954, 21.42008113861084]

Job Status: job has successfully run

21.41460943222046

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536,  
21.284027338027954, 21.42008113861084, 21.41460943222046]

Job Status: job has successfully run

21.335716485977173

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,

21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536,  
21.284027338027954, 21.42008113861084, 21.41460943222046, 21.335716485977173]

Job Status: job has successfully run

21.44700312614441

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536,  
21.284027338027954, 21.42008113861084, 21.41460943222046, 21.335716485977173,  
21.44700312614441]

Job Status: job has successfully run

21.389859914779663

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
21.418308973312378, 21.314120531082153, 21.349019765853882, 21.36039972305298,  
21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
21.383166074752808, 21.302529335021973, 21.334707975387573, 21.416112184524536,  
21.284027338027954, 21.42008113861084, 21.41460943222046, 21.335716485977173,  
21.44700312614441, 21.389859914779663]

Job Status: job has successfully run

21.383700847625732

[21.38860321044922, 21.39008092880249, 21.278805017471313, 21.375648021697998,  
21.30289578437805, 21.38517928123474, 21.357381343841553, 21.36675477027893,  
21.37654972076416, 21.523606538772583, 21.371176958084106, 21.479830503463745,  
21.32796287536621, 21.38793444633484, 21.331576347351074, 21.31588625907898,  
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21.319838047027588, 21.371932983398438, 21.3367440700531, 21.478978395462036,  
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Job Status: job has successfully run

21.42940402030945

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Job Status: job has successfully run

21.427278518676758

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Job Status: job has successfully run

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Job Status: job has successfully run

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Job Status: job has successfully run

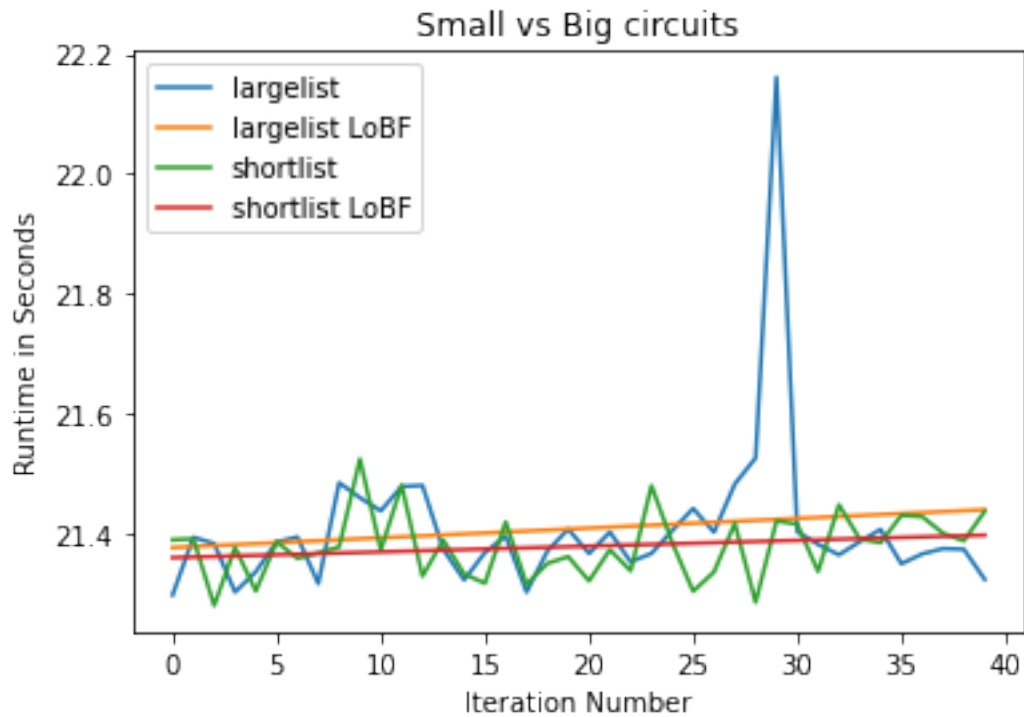
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```

```
[109]: #big = [map(int, x) for x in largelist]  
ylargelist= []  
yshortlist= []  
for i in range(len(largelist)):  
    ylargelist.append(i)  
  
for i in range(len(shortlist)):  
    yshortlist.append(i)  
  
import matplotlib.pyplot as plt  
plt.xlabel("Iteration Number")  
plt.ylabel("Runtime in Seconds")  
plt.title("Small vs Big circuits")  
plt.plot(ylargelist, largelist, label = 'largelist')  
#line of best fit  
plt.plot(ylargelist, np.poly1d(np.polyfit(ylargelist, largelist, 1))(ylargelist), label = 'largelist LoBF')  
plt.plot(yshortlist, shortlist, label = 'shortlist')  
#line of best fit  
plt.plot(yshortlist, np.poly1d(np.polyfit(yshortlist, shortlist, 1))(yshortlist), label = 'shortlist LoBF')  
plt.legend()  
plt.show()
```





```
[110]: # Python program to get average of a list
def Average(lst):
    return sum(lst) / len(lst)

average1 = Average(largelist)
average2 = Average(shortlist)

# Printing average of the list
print("Average of the largelist =", round(average1, 2))
# Printing average of the list
print("Average of the shortlist =", round(average2, 2))
```

Average of the largelist = 21.41

Average of the shortlist = 21.38

```
[ ]:
```