Lab Setup:
Step-1)Adding Peers node

```
Fatal: Failed to read genesis file: open lab1/genesis.json: no such file or directory
[Dhrumils-MBP:lab1 dhrumil$ ls
bkc_data    genesis.json
[Dhrumils-MBP:lab1 dhrumil$ geth --datadir bkc_data init genesis.json
INFO [09-26|00:16:33.842] Maximum peer count                       ETH=50 LES=0 total=50
INFO [09-26|00:16:33.864] Set global gas cap                       cap=25000000
INFO [09-26|00:16:33.865] Allocated cache and file handles         database=/Users/dhrumil/Documents/sem3/Blockchain/labs/lab1/bkc_data/geth/chaindata cache=16.00MiB handles=16
INFO [09-26|00:16:33.886] Writing custom genesis block
INFO [09-26|00:16:33.887] Persisted trie from memory database      nodes=0 size=0.00B time="29.233µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [09-26|00:16:33.888] Successfully wrote genesis state         database=chaindata hash="b913d0…07d3df"
INFO [09-26|00:16:33.888] Allocated cache and file handles         database=/Users/dhrumil/Documents/sem3/Blockchain/labs/lab1/bkc_data/geth/lightchaindata cache=16.00MiB handles=16
INFO [09-26|00:16:33.907] Writing custom genesis block
INFO [09-26|00:16:33.907] Persisted trie from memory database      nodes=0 size=0.00B time="3.669µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [09-26|00:16:33.907] Successfully wrote genesis state         database=lightchaindata hash="b913d0…07d3df"
[Dhrumils-MBP:lab1 dhrumil$ geth --datadir bkc_data --networkid 89992018 --bootnodes enode://7320559847736145843099b94c6c67d52c3abd4af42200dde25557d58da3f36358b6a029ff37058461ee5e627aed6fb55386c3e334b54fa3
5480aee4ea73eb61@128.230.208.73:30301 console 2>console.log
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.21-stable/darwin-amd64/go1.15.1
at block: 0 (Wed Dec 31 1969 19:00:00 GMT-0500 (EST))
 datadir: /Users/dhrumil/Documents/sem3/Blockchain/labs/lab1/bkc_data
 modules: admin:1.0 debug:1.0 eth:1.0 ethash:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 txpool:1.0 web3:1.0

> admin.addPeer("enode://7320559847736145843099b94c6c67d52c3abd4af42200dde25557d58da3f36358b6a029ff37058461ee5e627aed6fb55386c3e334b54fa35480aee4ea73eb61@128.230.208.73:30303")
true
>  admin.peers
[]
> admin.addPeer("enode://7320559847736145843099b94c6c67d52c3abd4af42200dde25557d58da3f36358b6a029ff37058461ee5e627aed6fb55386c3e334b54fa35480aee4ea73eb61@128.230.208.73:30303")
true
> admin.peers
[{
    caps: ["eth/63", "eth/64", "eth/65"],
    enode: "enode://7320559847736145843099b94c6c67d52c3abd4af42200dde25557d58da3f36358b6a029ff37058461ee5e627aed6fb55386c3e334b54fa35480aee4ea73eb61@128.230.208.73:30303",
    id: "3fecb30cf93a6c1b7a6b38436d22e06cb3e0886d547cab41667d489c0a2dea25",
    name: "Geth/v1.9.12-stable/linux-amd64/go1.13.3",
    network: {
      inbound: false,
      localAddress: "192.168.1.195:49736",
      remoteAddress: "128.230.208.73:30303",
      static: true,
      trusted: false
    },
    protocols: {
      eth: {
        difficulty: 12292148253,
        head: "0x9b8cbd0fa0a268b1d80dc97874c29042040a27951653146e1711362748f5038b",
        version: 65
      }
    }
}]
> 
```

Step-2) Creating new Account

Question 1) I have unlocked the account and have started the mining process . As you can see in the screen shot after 1 minute the amount of coin i have mined has increased because when i run miner.getHashRate() i get a value which is greater than zero which means that mining process was running.

Question 2)
Below is the script that I have used to accomplish this task. In last_n_block i have used for loop to iterate and get the (current-i)th block where current block is web3.eth.blockNumber . "get_latest_transcation" method iterates from the latest block till the transaction count of the block is non zero . Once we find the block number and transaction count we can use the getTransactionFromBlock method to print the transaction.

Script:
```
function last_n_block(n){
       var latest_block = web3.eth.blockNumber;
       for (var i=0; i < n; i++) {
         console.log(JSON.stringify(web3.eth.getBlock(latest_block - i)));
         console.log("\n");
       }
}

function get_latest_transcation(){
       var latest_block = web3.eth.blockNumber;
       var current = 0;
```

```
        while
(web3.eth.getBlockTransactionCount(web3.eth.getBlock(latest_block-current)['hash'])==0) {
                current = current+1;
        }

        var total_transcation =
web3.eth.getBlockTransactionCount(web3.eth.getBlock(latest_block-current)['hash'])
        console.log("Dhrumil total transaction "+total_transcation);
        for(var i=0;i<total_transcation;i++){

console.log(JSON.stringify(web3.eth.getTransactionFromBlock(web3.eth.getBlock(latest_block-
current)['hash'], i)));
                        console.log("\n");

        }

}
```

Output: Print last 3 block

6cadc001622fb5e363b421","sha3Uncles":"0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347","size":538,"stateRoot":"0x7ed5734218fa6d9b49e41e1d00ab24ac9710de5b8c72f58c7da4f30899888cea","timestamp":1601102033,"totalDifficulty":"12734003813","transactions":[],"transactionsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","uncles":[]}

{"difficulty":"817387","extraData":"0xd88301090c846765746888676f312e31332e33856c696e7578","gasLimit":8000000,"gasUsed":0,"hash":"0x216f74fa13e783126226dcc306eddab05c231f380c22a43d9497e867e5967ffc","logsBloom":"0x00","miner":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","mixHash":"0x5038e2e45dd4a3ec5c650637ff04c1ef21167295e13ee4a52c3720dcf966306c","nonce":"0x2b0e1be742c84857","number":18943,"parentHash":"0x87683d6613d888a3fbbd0e336cd05f672b21d292087b7ff78e86d7f237d81200","receiptsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","sha3Uncles":"0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347","size":538,"stateRoot":"0x2d4e7b5b536f2a1ad309ea4e993f693f85da98dc8c3de5be47f35b1e774473cb","timestamp":1601101993,"totalDifficulty":"12733187623","transactions":[],"transactionsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","uncles":[]}

undefined
> last_n_block(3)
{"difficulty":"814597","extraData":"0xd88301090c846765746888676f312e31332e33856c696e7578","gasLimit":8000000,"gasUsed":0,"hash":"0x058999cbff239b4a7c622ae50e1b71df7e46ff322ea810d1db80dde637ca9f4b","logsBloom":"0x00","miner":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","mixHash":"0x8656fb77b206bee6a5cd2113c9f5516cbd67c0dcc632f8e16fa55a5b59ce40dd","nonce":"0x30127878b1eb5c69","number":18948,"parentHash":"0x3b63cec0f441bb829f339ba64bd4592f11943a41ac43fc1da5616a92fd279990","receiptsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","sha3Uncles":"0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347","size":538,"stateRoot":"0xd14d52ec7d430f3588db193f1261ee4abd5d96ceb8e6859e7c9fad95f9a540a84","timestamp":1601102132,"totalDifficulty":"12737263796","transactions":[],"transactionsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","uncles":[]}

{"difficulty":"814200","extraData":"0xd88301090c846765746888676f312e31332e33856c696e7578","gasLimit":8000000,"gasUsed":0,"hash":"0x3b63cec0f441bb829f339ba64bd4592f11943a41ac43fc1da5616a92fd279990","logsBloom":"0x00","miner":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","mixHash":"0x30b290acb19d51c2712579b740423869b9abe2f70e6b99d2124f84bfba657ac3","nonce":"0x5c9034aa25e8e1bf","number":18947,"parentHash":"0x3e467d4e5adb1195b036d4e94bd1697fb6f2d311d1ce9496a5299c8de4a3b0ef","receiptsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","sha3Uncles":"0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347","size":538,"stateRoot":"0x7f659ce8713a80774dc02c0caecd2ee0704cff9258ce3ea3063c7fc5f88f66dc","timestamp":1601102128,"totalDifficulty":"12736449199","transactions":[],"transactionsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","uncles":[]}

{"difficulty":"815394","extraData":"0xd88301090c846765746888676f312e31332e33856c696e7578","gasLimit":8000000,"gasUsed":0,"hash":"0x31fc5600859babac79a90675ea5b8ab157f8366fe1910135e380cf5733a8377a","logsBloom":"0x00","miner":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","mixHash":"0x9c2ca85a0c773924daaf99033a47eb8101cba233ed81e0ddd55e3eb1580928c2","nonce":"0x4831c4e0bd175bcb","number":18946,"parentHash":"0x3e467d4e5adb1195b036d4e94bd1697fb6f2d311d1ce9496a5299c8de4a3b0ef","receiptsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","sha3Uncles":"0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347","size":538,"stateRoot":"0x33e21ea17571c317773cfd538eb20167d9c2989e4acd8484cac1b52508ed7f48","timestamp":1601102082,"totalDifficulty":"12735634999","transactions":[],"transactionsRoot":"0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421","uncles":[]}

Output : print latest transaction

undefined
> loadScript('/Users/dhrumil/Documents/sem3/Blockchain/labs/lab1/task2.js')
undefined
> get_latest_transcation()
Dhrumil total trasncation 3
{"blockHash":"0x0abf788dd8fb9e463288e24e173801191b406b779402c981da5dcbea96ddbc7f","blockNumber":18813,"from":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","gas":21000,"gasPrice":"1000000000","hash":"0x438dd3a442ab6c915ac44eafc934ae406bf6971038dceada0bbe1ee4244d450d","input":"0x","nonce":30,"to":"0x1cdbbd45196259913c4aa2a7c6c32e64c425a9f4","transactionIndex":0,"value":"20000000000000000000","v":"0xaba56c8","r":"0xfd4361488b3cd6487265c8ffa8c67bd58e5c384a6b383e9d07f454b574f7ec4f","s":"0x1cd5980b015f549296afafa7957ae2957dfdbf16774100c86453179703ecd38d"}

{"blockHash":"0x0abf788dd8fb9e463288e24e173801191b406b779402c981da5dcbea96ddbc7f","blockNumber":18813,"from":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","gas":21000,"gasPrice":"1000000000","hash":"0x6e052183a7c752cc0e652d68f2893cbb243a9a755a0ae81502acc991688f8988","input":"0x","nonce":31,"to":"0xc363dcd323725329641b94cea6a8ae1a54af4fa3","transactionIndex":1,"value":"20000000000000000000","v":"0xaba56c8","r":"0x5cdb6f1d3961166d198bb73af461acd55483fe1be02d5936de65249c17797ad4","s":"0x47e2d6ee68dfe17ff1631150a453600a57a7ef8b38c92001607551a16a32e2c8"}

{"blockHash":"0x0abf788dd8fb9e463288e24e173801191b406b779402c981da5dcbea96ddbc7f","blockNumber":18813,"from":"0x3b0a30038dd86cd06b6d992a28e0caa93342a25b","gas":21000,"gasPrice":"1000000000","hash":"0xc1222aad721c00db4c9eeb78fd7aa6f9de19fffd6d470ce96adf34170d09091c","input":"0x","nonce":32,"to":"0xadb9bd666867ef11cacccd4953ac749ee29789a1","transactionIndex":2,"value":"20000000000000000000","v":"0xaba56c8","r":"0x39f4f04b08029492e1b77525e1ed22cedc2f87b906af7e254d868809df327fb6","s":"0x5d7638f5c2603afe5537c8569d039183404331444e8e7eb1076d5283246006dd"}

undefined
>

Task 3)

In this task we have submitted the transaction. After that we have used the "getTranscation"method to find out the block number this transaction is included in. We then check the latest block which is included in the block chain. As we can see from the screen shot this transaction is included in the blockchain.

Window 1:

```
lab1 — geth --datadir bkc_data --networkid 89992018 --bootnodes enode://7320559847736145843099b94c6c67d52c3abd4af42200dde25557d58da3f36358b6a029ff37058461ee5e627...

...f37058461ee5e627aed6fb55386c3e334b54fa35480aee4ea73eb61@128.230.208.73:30301 console          ~/Documents/sem3/Blockchain/labs/lab1 — -bash

undefined
> eth.accounts
["0xc363dcd323725329641b94cea6a8ae1a54af4fa3", "0xc4c3766d63e21f76ee3a2980f282b03058d1ac06"]
> personal.unlockAccount(eth.accounts[1])
Unlock account 0xc4c3766d63e21f76ee3a2980f282b03058d1ac06
Passphrase:
true
> personal.unlockAccount(eth.accounts[0])
Unlock account 0xc363dcd323725329641b94cea6a8ae1a54af4fa3
Passphrase:
true
> web3.fromWei(eth.getBalance(eth.accounts[0]),"ether")
20
> web3.fromWei(eth.getBalance(eth.accounts[1]),"ether")
88.75
> eth.sendTransaction({from:"0xc363dcd323725329641b94cea6a8ae1a54af4fa3", to:"0xc4c3766d63e21f76ee3a2980f282b03058d1ac06", value:web3.toWei(1,"ether")})
"0xba0ccfeac1f7dd0eb39c8b88866308fda1e3b23ce23b16e725494b96ce66388f"
> eth.getTransaction(""0xba0ccfeac1f7dd0eb39c8b88866308fda1e3b23ce23b16e725494b96ce66388f")
...
... ^C
> eth.getTransaction("0xba0ccfeac1f7dd0eb39c8b88866308fda1e3b23ce23b16e725494b96ce66388f")
{
  blockHash: "0x510d8ef1f1d1f345595082c83d2361c5c8299400f41cd9a11e71d8573c4e1228",
  blockNumber: 18981,
  from: "0xc363dcd323725329641b94cea6a8ae1a54af4fa3",
  gas: 21000,
  gasPrice: 1000000000,
  hash: "0xba0ccfeac1f7dd0eb39c8b88866308fda1e3b23ce23b16e725494b96ce66388f",
  input: "0x",
  nonce: 0,
  r: "0x41ff62233669f7a8bfc94300f65c21c941a889c7675628dbf87c3f260d24f88c",
  s: "0x3f188c7dd4884040b6beb21bc9eb26a74c6b21da2ae315da017521abcb1b1b0",
  to: "0xc4c3766d63e21f76ee3a2980f282b03058d1ac06",
  transactionIndex: 0,
  v: "0xaba56c7",
  value: 1000000000000000000
}
> eth.blockNumber
18984
> eth.blockNumber
18986
```

Window 2:

```
lab1 — geth --datadir bkc_data --networkid 89992018 --bootnodes enode://7320559847736145843099b94c6c67d52c3abd4af42200dde25557d58da3f36358b6a029ff37058461ee5e627...

...f37058461ee5e627aed6fb55386c3e334b54fa35480aee4ea73eb61@128.230.208.73:30301 console          ~/Documents/sem3/Blockchain/labs/lab1 — -bash

  r: "0x41ff62233669f7a8bfc94300f65c21c941a889c7675628dbf87c3f260d24f88c",
  s: "0x3f188c7dd4884040b6beb21bc9eb26a74c6b21da2ae315da017521abcb1b1b0",
  to: "0xc4c3766d63e21f76ee3a2980f282b03058d1ac06",
  transactionIndex: 0,
  v: "0xaba56c7",
  value: 1000000000000000000
}
> eth.blockNumber
18984
> eth.blockNumber
18986
> eth.getBlock(18981,true)
{
  difficulty: 811016,
  extraData: "0xd88301090c846765746888676f312e31332e33856c696e7578",
  gasLimit: 8000000,
  gasUsed: 21000,
  hash: "0x510d8ef1f1d1f345595082c83d2361c5c8299400f41cd9a11e71d8573c4e1228",
  logsBloom: "0x0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000",
  miner: "0x3b0a30038dd86cd06b6d992a28e0caa93342a25b",
  mixHash: "0xb188c0b45e8ce393e9fa5c5c73ca72e911769545cd0e90ad054bfde36031e85f",
  nonce: "0x65b6d20269991603",
  number: 18981,
  parentHash: "0xfd04a87b0a47b31dfde6587f8ec37f4b85b6d6a14452dfaa9f310b2490637fbc",
  receiptsRoot: "0x199fa4cec0f51a444d307ffd5f3121ae9b6a6a789dbdcf99e60cd788a8ba6a4c",
  sha3Uncles: "0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347",
  size: 654,
  stateRoot: "0xead98f06f750e4bcb24711952ce47742cf94da898e82f2a3bbc960fbb2a60d0e",
  timestamp: 1601102683,
  totalDifficulty: 12764081903,
  transactions: [{
    blockHash: "0x510d8ef1f1d1f345595082c83d2361c5c8299400f41cd9a11e71d8573c4e1228",
    blockNumber: 18981,
    from: "0xc363dcd323725329641b94cea6a8ae1a54af4fa3",
    gas: 21000,
    gasPrice: 1000000000,
    hash: "0xba0ccfeac1f7dd0eb39c8b88866308fda1e3b23ce23b16e725494b96ce66388f",
    input: "0x",
    nonce: 0,
    r: "0x41ff62233669f7a8bfc94300f65c21c941a889c7675628dbf87c3f260d24f88c",
    s: "0x3f188c7dd4884040b6beb21bc9eb26a74c6b21da2ae315da017521abcb1b1b0",
    to: "0xc4c3766d63e21f76ee3a2980f282b03058d1ac06",
    transactionIndex: 0,
    v: "0xaba56c7",
    value: 1000000000000000000
  }],
  transactionsRoot: "0x9f11e51c7992380f8d97dccb2b0d2e811e3bdc45a0e92d5ed7fa5d21f1aaf5ab",
  uncles: []
```