

# Blockchain and Cryptocurrencies Midterm Exam

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## 1 Q1

Using <https://www.blockchain.com/btc/tx/1ab040e6c955415a2ea236d115c92862479dac23ce5c268047361> to check the txn details, and using Google for currency conversion, we get a value of Rs. 268.58 (as of 8:42 AM, 14/3/19).

## 2 Q2

Looking at the number of blocks mined for the last two days on <https://www.blockchain.com/btc/blocks/1552446855358>, we can see that there have been 142 blocks mined on 13/3/19, and 134 blocks mined on 12/3/19

If we take an average, we get a rate of 138 blocks mined per day. Fast forward to 20/3/19, we can guess there would be roughly  $138 * 7 = 966$  blocks mined by the end of the 20th.

Looking at the last block height on 13/3/19, we can estimate that a block mined on 20/3/19 would range in height from 567,772 to 567,910.

Furthermore, looking at the timings of the blocks being mined, they seem to be mined at a rate of roughly 7 blocks per hour.

Thus, we can add the appropriate amount of bitcoins to get an approximate block height at, say, 9 AM by  $567,772 + (7 * 9) = 567,835$  as the block height.

## 3 Q3

Once again we look at <https://www.blockchain.com/en/charts/total-bitcoins?timespan=30days&showDataPoints=true> to see the amount of bitcoins in circulation for the last 30 days. Due to time restrictions, let's consider the rate of increase from 10/3/19 to 12/3/19. (Both amounts taken at 5:30 AM)

Looking at the data points, we see that in 2 days the number of bitcoins has increased by 3,562, i.e 1,781 bitcoins per day. As the graph is roughly linear, we can simply multiply  $1,781 * 4 = 7,124$ .

Dividing 1,781 by 48, we get a fractional amount over 37 bitcoins added every half an hour. We simply add  $37 * 7 = 259$  bitcoins to 7,124, and we get an increase of 7,383 bitcoins from the last reading.

This gives us an approximate amount of 17,592,508 bitcoins at 9 AM on 16/3/19.

## 4 Q4

Using the calculator at <https://bitcoinwisdom.com/bitcoin/difficulty>, we can set the difficulty to  $6068891541676_{10}$  and the BTC/hour to 1, giving us the needed number of hashes of  $5.792 * 10^{14}$  hashes.

## 5 Q5

Checking on <https://live.blockcypher.com/btc-testnet/address/n3WDexiKdJ7RA2xW1Zxx16UpBtuy276L> the address has a balance of 63.97362886 BTC as of 9:27 AM, 14/3/19

## 6 Q6

A node does not have a chance to do so, as when the UTXO is created, an  $LS_{UTXO}$  is also created, which locks the UTXO to a specific address. Thus any node other than the one specified in the  $LS_{UTXO}$  will be unable to consume the UTXO, even with the appropriate  $ULS_{UTXO}$ .

## 7 Q7

According to <https://www.blockchain.com/btc/block-height/500000>, the UTXO is 3.39351625 BTC.