

## Homework Class Test

This is a demonstration of my homework L<sup>A</sup>T<sub>E</sub>X class. It is an extension of the `amsart` and should have all of its functionality. These are some of the set symbols:  $\mathbb{C} \supset \mathbb{R} \supset \mathbb{Q} \supset \mathbb{Z} \supset \mathbb{N}$ , then some Greek and other mathematical symbols are,  $\alpha, \varepsilon, \partial, \rightarrow, \Rightarrow, \hookrightarrow, \Rightarrow, \Leftarrow$ . We can also insert multiple figures as seen in figure 1.

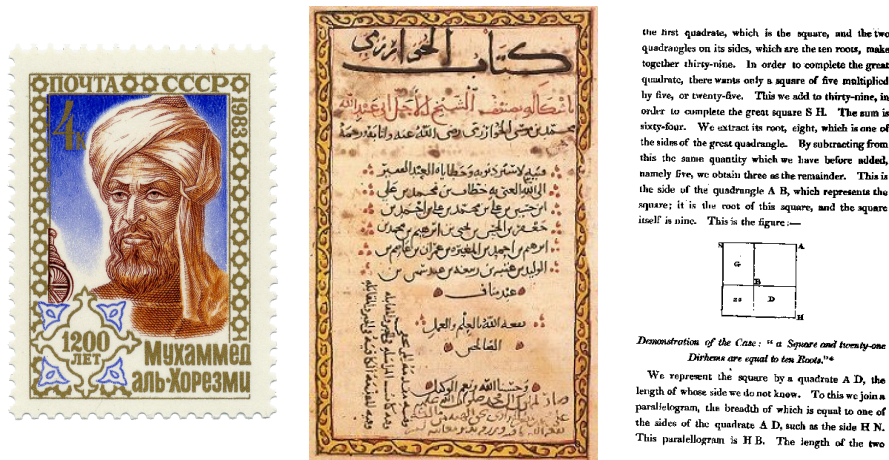


FIGURE 1. Al'Khwarizmi

**Question 1.** Prove that  $\exists(x, y) \in \mathbb{Z}$  such that  $x + y = 4$ .

We show,

*Proof.* Four is the sum of two integers.

$1, 3 \in \mathbb{Z}$  and  $1 + 3 = 4$ .

*QED.*

**Bonus Question 1.** Bonus Question Statement

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**Bonus Question 2.** Euclidean Algorithm

You may write code,

```
1 def gcd(x, y): # x > y
2     x0, x1, y0, y1 = 1, 0, 0, 1
3     while (y > 0):
4         print('\gcd(%d, %d) &: %d &= ' % (x, y, x), end='')
5         q, r = divmod(x, y)
6         # print('%d \times %d + %d &\quad' % (q, y, r), end='')
7         # print('[%d, %d] - %d[%d, %d] = ' % (x0, x1, q, y0, y1), end='')
8         x, y = y, r
9         x0, x1, y0, y1 = y0, y1, x0 - q * y0, x1 - q * y1
10        # print('[%d, %d] \\\' % (y0, y1))
11    return x, x0, x1
```

**Question 2.** What is the cardinality of Natural Numbers?

It is  $\aleph_0$ .

**Question 3.** Is the cardinality of Naturals and Reals the same because they are both infinite?

No, the cardinality of Reals is greater because they are also un-listable (uncountable).

**Question 99.** Custom Numbering.

This question is numbered 99.

**Question 4.** Finally the numbered bullets are done with the `enumerate` package,

1) With just bullets,

- **Cats**
- *Dogs*

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