While iterations   P30196_en

You have to program several functions. Do not use the math module.

1. Write an integer function *int_root(n)* that given a natural number *n* returns $\lfloor \sqrt{n} \rfloor$.

2. Write a function *int_log(a, b)* that given natural numbers *a* greater than one and *b* greater than zero returns natural *k* such that $a^k \leq b < a^{k+1}$.

3. Write a function *gcd_lcm(a, b)* that given natural numbers *a* and *b* such that $a \neq 0$ or $b \neq 0$ returns the greatest common divisor and the least common multiple. Your code has to implement the Euclid's algorithm.

4. Write a boolean function *is_prime(n)* that given a natural number *n* returns `True` if and only if *n* is prime.

5. In order to play table games at the casino you need some tokens. Red tokens cost 7 euros and yellow tokens cost 4. Write a function *buy_tokens(n)* that given a number *n* of euros such that $n \geq 20$, it returns the equivalence in tokens. When several equivalences are possible the function returns the one minimizing the total number of tokens.

6. Write a string function *max_overlap(s, t)* that given two strings *s* and *t* returns the longest string that is a common prefix of *s* and *t*.

Scoring

The first function counts 15 points. Other ones count 17 point each one.

Sample session

```
>>> int_root(19)
4
>>> int_log(3, 20)
2
>>> gcd_lcm(12,18)
(6, 36)
>>> is_prime(51)
False
>>> buy_tokens(50)
(6, 2)
>>> max_overlap('bugs', 'bunny')
bu
```

Problem information

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