

University of Wrocław: Data Science - Math and coding problems

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Task 1:

k = 5

answer: 5 items [89899, 89989, 98899, 98999, 99989]

k = 10

answer: 42 items [8888888989, 8888898899, 8889888989, 8889889889, 8889899899, 8889899999, 8889988989, 8889998899, 8889998989, 8889999889, 8889999989, 8898888989, 8898889889, 8898898989, 8898899889, 8898899989, 8898988989, 8898989889, 8898989989, 8898998889, 8898998989, 8898999889, 8898999989, 8899888989, 8899889889, 8899889989, 8899898889, 8899898989, 8899899889, 8899899989, 8899988989, 8899989889, 8899989989, 8899998889, 8899998989, 8899999889, 8899999989, 8988888989, 8988889889, 8988898989, 8988899889, 8988899989, 8988988989, 8988989889, 8988989989, 8988998889, 8988998989, 8988999889, 8988999989, 8989888989, 8989889889, 8989889989, 8989898889, 8989898989, 8989899889, 8989899989, 8989988989, 8989989889, 8989989989, 8989998889, 8989998989, 8989999889, 8989999989, 8998888989, 8998889889, 8998889989, 8998898889, 8998898989, 8998899889, 8998899989, 8998988989, 8998989889, 8998989989, 8998998889, 8998998989, 8998999889, 8998999989, 8999888989, 8999889889, 8999889989, 8999898889, 8999898989, 8999899889, 8999899989, 8999988989, 8999989889, 8999989989, 8999998889, 8999998989, 8999999889, 8999999989, 9888888989, 9888889889, 9888898989, 9888899889, 9888899989, 9888988989, 9888989889, 9888989989, 9888998889, 9888998989, 9888999889, 9888999989, 9889888989, 9889889889, 9889889989, 9889898889, 9889898989, 9889899889, 9889899989, 9889988989, 9889989889, 9889989989, 9889998889, 9889998989, 9889999889, 9889999989, 9898888989, 9898889889, 9898889989, 9898898889, 9898898989, 9898899889, 9898899989, 9898988989, 9898989889, 9898989989, 9898998889, 9898998989, 9898999889, 9898999989, 9899888989, 9899889889, 9899889989, 9899898889, 9899898989, 9899899889, 9899899989, 9899988989, 9899989889, 9899989989, 9899998889, 9899998989, 9899999889, 9899999989, 9988888989, 9988889889, 9988889989, 9988898889, 9988898989, 9988899889, 9988899989, 9988988989, 9988989889, 9988989989, 9988998889, 9988998989, 9988999889, 9988999989, 9989888989, 9989889889, 9989889989, 9989898889, 9989898989, 9989899889, 9989899989, 9989988989, 9989989889, 9989989989, 9989998889, 9989998989, 9989999889, 9989999989, 9998888989, 9998889889, 9998889989, 9998898889, 9998898989, 9998899889, 9998899989, 9998988989, 9998989889, 9998989989, 9998998889, 9998998989, 9998999889, 9998999989, 9999888989, 9999889889, 9999889989, 9999898889, 9999898989, 9999899889, 9999899989, 9999988989, 9999989889, 9999989989, 9999998889, 9999998989, 9999999889, 9999999989]

code

```
// task1.py
from itertools import product, count

def gen_nums(digit_len):
    num_tuple = list(product((8, 9), repeat=digit_len))
    return [int(''.join(map(str, idx))) for idx in num_tuple]

def is_prime(n):
    if n <= 1: return False
    for i in count(2):
        if i * i > n: return True
        if n % i == 0: return False

def task_1(k=5):
    prime_num = [i for i in gen_nums(k) if is_prime(i)]
    return prime_num

print('k=5:', task_1(5))
print('k=10:', task_1(10))
```

Task 2

Text A: but eeyore was saying to himself this writing business pencils and whatnot over rated if you ask me silly stuff nothing in it

Text A max value(S): 553

Text B: when poohs a w what it was he nearly fell down he was so pleased it was a special pencil case there were pencils in it marked b for bear and pencils marked hb for helping bear and pencils marked bb for brave bear there was a knife for sharpening the pencils and india rubber for rubbing out anything which you had spelt wrong and a ruler for ruling lines for the words to walk on and inches marked on the ruler in case you wanted to know how many inches anything w a sand blue pencils and red pencils and green pencils for saying special

Text B max value(S): 2154

code

```
// task2.py
def wordBreak(words, word, out=''):
    if not word:
        out_score = []
        seg_list.append(out)
        for i in out.split():
            out_score.append(len(i)**2)
        score_list.append(sum(out_score))
        return
    for i in range(1, len(word) + 1):
        prefix = word[:i]
        if prefix in words:
            wordBreak(words, word[i:], out + ' ' + prefix)

words_V = ['h', 'ca', 'go', 'lit', ..... 'but', 'oh', 'tin', 'pen']
Text_A =
    'buteeyorewassayingtohimselfthiswritingbusinesspencilsandwhatnotoverratedifyouaskmesillystuffnoth
Text_B =
    'whenpoohsawwhatitwashenearlyfelldownhewassopleaseditwasaspecialpencilcasetherewerepencilsinitmarl
Text =
    [Text_A,Text_B[0:103],Text_B[103:220],Text_B[220:319],Text_B[319:432],Text_B[432:]]
res_text = []
max_values=[]
for i in range(len(Text)):
    seg_list = []
    score_list = []
    wordBreak(words_V,Text[i])
    max_index = score_list.index(max(score_list))
    res_text.append(seg_list[max_index])
    max_values.append(score_list[max_index])
print('Text A:',res_text[0])
print('Text A max value(S):',max_values[0])
```

```
print('Text B:',res_text[1]+res_text[2]+res_text[3]+res_text[4])
print('Text B max
      value(S):',max_values[1]+max_values[2]+max_values[3]+max_values[4])
```

Task 3

answer:

$$\frac{1}{48}$$

Task 4

answer:

$$\frac{1}{10240}$$

Task 5

failed