Problem33

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1 Problem 33

1.1 Digit cancelling fractions

The fraction 49/98 is a curious fraction, as an inexperienced mathematician in attempting to simplify it may incorrectly believe that $49/98 = 4/8$, which is correct, is obtained by cancelling the 9s.

We shall consider fractions like, $30/50 = 3/5$, to be trivial examples.

There are exactly four non-trivial examples of this type of fraction, less than one in value, and containing two digits in the numerator and denominator.

If the product of these four fractions is given in its lowest common terms, find the value of the denominator.

[ ]:
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def list_from_int(num):
    int_list = []
    for d in str(num):
        int_list.append(d)
    return int_list

num_prod = 1
den_prod = 1

for num in range(10,100):
    num_list = list_from_int(num)
    if num_list[0] == num_list[1] or num_list.count("0") > 0: continue

    for den in range(num + 1, 100):
        den_list = list_from_int(den)
        if den_list[0] == den_list[1] or den_list.count("0") > 0: continue

        if num_list[0] in den_list or num_list[1] in den_list:
            div1 = num/den

            if num_list[0] in den_list:
                n2 = num_list[1]
                den_list.remove(num_list[0])
                d2 = den_list[0]
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            else:
                n2 = num_list[0]
                den_list.remove(num_list[1])
                d2 = den_list[0]

            div2 = int(n2)/int(d2)

            if div1 == div2:
                num_prod *= num
                den_prod *= den

print(num_prod, den_prod)
```

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387296 38729600
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So answer is $387296/38729600 = 1/100 \therefore denominator = 100$ Answer in < 0.1 s