PROBLEM 5: PRO RATA

For this exercise you must write a program that helps renters calculate their first month's rent, should they move in on a day other than the first day of the month. The user will input the amount due for rent each month followed by the date on which they intend to move in. Your program must then output the amount of rent due for that first month, using each of the three most common methods of calculating a *pro rata* rent charge.

The term *pro rata* comes from Latin and means *in equal portions* or *in proportion.* In the context of rent, charging a *pro rata* or, as it is often rendered in English, prorated amount means to charge proportionally less than a full month's rent when the tenant will occupy the property for less than a month. However, the months of the year do not all have the same number of days, and different approaches to calculating the per-day amount of rent have emerged. There are three commonly-used methods:

BY DAYS IN THE MOVE-IN MONTH

Using this method, the monthly rent is divided by the total number of days in the month in which the tenant will move in. For most months, this will be 30 or 31 days but in the case of February it will be 28 days or 29 if it is a leap year. For example, to calculate the prorated first month's rent for a monthly rent of $1,500 and a move-in day of March 22:

$$\text{daily rent} = \frac{\$1,500 \text{ monthly rent}}{31 \text{ days in March}} = \$48.39 \text{ per day in March}$$

$$\text{March 22 move-in} = 10 \text{ days of occupancy}$$

$$\$48.39 \text{ per day} \times 10 \text{ days} = \$483.90$$

BY "BANKER'S MONTH"

Using this method, the monthly rent is always divided by 30 days, regardless of the actual number of days in the move-in month. For example, to calculate the prorated first month's rent for a monthly rent of $1,500 and a move-in day of March 22:

$$\text{daily rent} = \frac{\$1,500 \text{ monthly rent}}{30 \text{ days in a banker's month}} = \$50.00 \text{ per day}$$

$$\text{March 22 move-in} = 10 \text{ days of occupancy}$$

$$\$50.00 \text{ per day} \times 10 \text{ days} = \$500.00$$

BY DAYS IN THE MOVE-IN YEAR

Using this method, the daily rental rate is calculated for the move-in year as a whole, regardless of what the move-in month may be. For example, to calculate the prorated first month's rent for a monthly rent of $1,500 and a move-in day of March 22:

$$\$1,500 \text{ monthly rent} \times 12 \text{ months in a year} = \$18,000 \text{ yearly rent}$$

$$\text{daily rent} = \frac{\$18,000 \text{ yearly rent}}{365 \text{ days in a year}} = \$49.32 \text{ per day}$$

$$\text{March 22 move-in} = 10 \text{ days of occupancy}$$

$$\$49.32 \text{ per day} \times 10 \text{ days} = \$493.20$$

Of course, if the move-in year is a leap year, you must divide by 366 days instead of 365.

Your program will receive input as soon as it launches. The first input will be the monthly rent expressed as an integer without a dollar sign ($) and without any separators. The second input will be the expected move-in date, expressed in the format `YYYY-MM-DD`. Your program must then output the prorated first month's rent as calculated by each of the above methods, in the order presented in this document, each on it's own line. All amounts must be output as US currency, with a leading dollar sign ($), a comma (,) as a thousands separator, exactly two digits after the decimal point, and all values rounded to the nearest whole cent (e.g. $1,070.34). You may safely assume that the given amount of monthly rent will be a positive integer less than 10,000. If you are given a date that is the first of the month, your program must output the message, "No prorating needed." If your program receives any invalid input, it must output the message, "Invalid input." and exit.

*Your program's output must match the examples given below **exactly**. Your program must not prompt for input. Note carefully the spelling, capitalization, punctuation, and spacing of the output. The input that will be given to your program is highlighted in **red**.*

EXAMPLE RUN 1

```
1500
2023-03-22
$483.90
$500.00
$493.20
```

EXAMPLE RUN 2

```
1700
2024-02-15
$879.30
$850.05
$836.10
```

EXAMPLE RUN 3

```
1850
2023-07-01
No prorating needed.
```