

The far-off country of Micomiconna has a calendar with no months or numbered dates. Instead, they have one holiday at the end of the year (called Holi Day), and every other day of the year is an eve of some other day of the year. We can model this using the following ML datatype:

```
datatype day = HoliDay | Eve of day;
```

For example, three days before Holi Day is `Eve(Eve(Eve(HoliDay)))`.

- a. Write a function `comesBefore` that takes two `days` and determines whether the first parameter comes before the second in the course of the year. For example, `comesBefore(Eve(Eve(Eve(Eve(HoliDay)))) , Eve(Eve(HoliDay)))` would return `true`, and `comesBefore(Eve(HoliDay) , Eve(HoliDay))` would return `false`.
- b. The Micomiconna National Committee on Calendar Revision meets for lunch every three days, ending with two days before Holi Day. That is, they meet two days before Holi Day, five days before, eight days before, eleven days before, and on any day for which the number of days before Holi Day mod 3 is 2. Write a function `isLunchDay` that takes a `day` and determines whether the committee meets for lunch that day. For example, `isLunchDay(Eve(Eve(Eve(Eve(Eve(HoliDay))))))` would return `true`, and `isLunchDay(Eve(Eve(Eve(HoliDay))))` would return `false`.
- c. By law all rental agreements terminate on Holi Day and include a one-time charge and a daily rate. Write a function `rentalCost` that takes a `day` when the agreement starts and `int` amounts for the one-time charge and daily rate (in Micimiconan Ducats) and calculates the total cost. For example, `rentalCost(Eve(Eve(HoliDay)) , 5 , 3)` would return 11 (that is, $5 + 2 \cdot 3$).
- d. All term papers at Micomiconna University are due on Holi Day. To get an extension, students must request that the paper be *assigned earlier* rather than due later. Write a function `doubleDate` which takes a `day` and returns another day that is twice as many days before Holi Day. For example, `doubleDate(Eve(Eve(HoliDay)))` would return `Eve(Eve(Eve(Eve(HoliDay))))`. (Note that no extension is possible for papers assigned on Holi Day itself.)