Design and implement an application that reads an integer value representing a year from the user. The purpose of the program is to determine if the year is a leap year (and therefore has 29 days in February) in the Gregorian calendar. A year is a leap year if it is divisible by 4, unless it is also divisible by 100 but not 400. For example, the year 2003 is not a leap year, but 2004 is. The year 1900 is not a leap year because it is divisible by 100, but the year 2000 is a leap year because even though it is divisible by 100, it is also divisible by 400. Produce an error message for any input value less than 1582 (the year the Gregorian calendar was adopted).

Leap Year

- A normal year has 365 days.
- A **Leap Year** has 366 days (the extra day is the 29th of February).

How to know if a year will be a Leap Year:

 Leap Years are any year that can be **evenly divided by 4** (such as 2012, 2016, etc)

 except if it can be **evenly divided by 100**, then it isn't (such as 2100, 2200, etc)

 ***except if*** it can be **evenly divided by 400**, then it is (such as 2000, 2400)

Why?

Because the Earth rotates about **365.242375** times a year ...

... but a normal year is **365** days, ...

... so something has to be done to "catch up" the extra **0.242375** days a year.

- So every 4th year we add an extra day (the 29th of February), which makes **365.25** days a year. This is fairly close, but is wrong by about 1 day every 100 years.
- So every 100 years we **don't** have a leap year, and that results in **365.24** days per year (1 day less in 100 year = -0.01 days per year). Closer, but still not accurate enough!
- So another rule says that every 400 years **is** a leap year again. This gets us **365.2425** days per year (1 day regained every 400 years = 0.0025 days per year), which is close enough to 365.242375 not to matter much.

So, which Are and which Aren't?

So 1600, 2000 and 2400 **are** leap years but 1700, 1800, 1900, 2100, 2200 and 2300 **are not**.

Apart from that, **every year divisible by 4** (2012, 2016, 2020, etc.) is a leap year.