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Andrew J. Simoson* (ajsimoso@king.edu), King University, Mathematics Department, 1350 King College Road, Bristol, TN 37620. *Bilbo and the Last Moon of Autumn.*

In J.R.R. Tolkien's *The Hobbit*, Bilbo must reach the Lonely Mountain in the waning light on the first day of the last moon of autumn; upon hearing such news, the chief dwarf of this expedition comments that no-one knows how to determine such dates anymore. However with a simple motion model of the earth, moon, and sun, and a little linear algebra, we show a way to determine years in advance any given lunar holiday. In particular, we find two rules, modulo some technicalities due to the Gregorian leap year phenomenon: Rule 1: A new moon will occur on the same date as it did 19 years ago (a rule used in the Julian calendar to determine the date of Easter), and Rule 2: A new moon will occur two days later than it did 160 years ago. (Received September 07, 2013)