Palindrome Dates in Ben Franklin's Life

By Aziz S. Inan, Ph.D., Electrical Engineering, University of Portland, Portland, OR

Introduction:

Numbers play such a critical role in our modern world. They form the backbone of our civilization and serve as the blood vessels vital for its survival. We encounter numbers in every phase of our daily lives such as in our monetary activities, keeping track of time, ages, birth dates, anniversary dates, phone numbers, bus numbers, house numbers, zip codes, speed limits, license numbers, identification numbers, security codes, etc.

There are many different types of numbers including integers, odd and even numbers, prime numbers, square and cube numbers, decimal numbers, binary numbers, and Fibonacci numbers. Some numbers also possess a sort of visual symmetry and these numbers possess a magical power to draw our attention. Symmetric numbers are also easier to recognize and remember.

A palindrome number is an integer that reads the same forward and backward. The word "palindrome" originates from the combination of two Greek words, palin (meaning backward, again) and dromos (meaning running). The Greek word palindromos means "running back again." The word "palindrome" was first coined and introduced into English literature by playwright and poet Ben Jonson in 1623, on line number 34 of his poem titled "An Execration upon Vulcan." This poem is the 43rd in a collection of Jonson's 89 poems first published in 1640 under the title Underwoods.

Multi-digit palindrome numbers are fun to encounter and they indeed stand out because of their mirror symmetry. For example, Benjamin Franklin (1706-1790) started writing his autobiography in 1771, the only palindrome year that occurred in the 18th century. Also, Franklin experienced seven two-digit palindrome ages throughout his lifetime:

* At palindrome age 11, he invented wooden paddles to use as swim fins;

* At 22, he formed a partnership to start a printing business in Philadelphia;

* At 33, he led an environmental group to clean-up Philadelphia's central commercial districts from industrial waste;

* At 44, in a letter he wrote to Peter Collinson, he described and proposed lightning rods to protect buildings from fires caused by lightning;

* At 55, he invented the glass armonica;

* At 66, following the judgment of a slave case in Britain which freed all slaves on the British Islands, he wrote a document stating that slavery is evil and unjust and that the judgment should be extended to the British colonies in America; and

* At 77, he signed the Treaty of Paris between Great Britain and the United States.

Last year (2009) was Franklin's 303rd birthday, his first palindrome birthday to occur in the 21st century and 101 years after that will mark his first palindrome birthday (404th) in the 22nd palindrome century, to occur in 2110. The first palindrome year to coincide with Franklin's palindrome birthday will be 2332, to mark his 626th birthday, and so on.

Eight-Digit Palindrome Dates:

Assuming each calendar date in all four-digit years is assigned a single eight-digit full date number as M1M2-D1D2-Y1Y2Y3Y4 (where the first two-digit M1M2 is the month, the next two D1D2 is the day, and the last four Y1Y2Y3Y4 is the year number), some of these dates are palindrome numbers (Y4Y3-Y2Y1-Y1Y2Y3Y4) and these special dates are referred to as palindrome dates [1, 2]. For example, there are a total of 12 palindrome dates in the 21st century. The first occurred on October 02, 2001 (10-02-2001) and the second was at the beginning of this year, on January 02, 2010 (01-02-2010). The third is to occur on November 02, 2011 (11-02-2011), the fourth is February 02, 2020 (02-02-2020) and the fifth will be December 02, 2021 (12-02-2021). The last (12th) palindrome date of this century will be September 02, 2090 (09-02-2090). It's interesting to note that all palindrome dates in the 21st century fall on the second day of the month since a palindrome date in year 20AB will have the general form BA-02-20AB. (No palindrome date exists in 2100, the last year of the 21st century, since 00-12-2100 does not represent a valid date.) Also, 12 more palindrome dates exist in the 22nd palindrome century (all to occur on the 12th day of the month) followed by another 12 in the 23rd century (all on the 22nd palindrome day of the month). The last (36th) palindrome date of this (third) millennium will be September 22, 2290 (09-22-2290).

Palindrome dates are notably rare. Before the beginning of this century, the last palindrome date of the second millennium in the M1M2-D1D2-Y1Y2Y3Y4 date format occurred 621 years ago on August 31, 1380 (since that date is 08-31-1380). There were a total of 43 palindrome dates happened in the second millennium, and they all occurred between the 11th and 14th centuries, split as 12, 12, 12 and 7. No palindrome dates existed between the 15th and 20th centuries. For example, Franklin didn't have any eight-digit palindrome dates during his lifetime simply because an eight-digit palindrome date number in year 17AB in the 18th century had to be in the form BA-71-17AB and this number is not a valid date number since 71 is not an acceptable day number.

Seven-Digit Palindrome Dates in Franklin's Life:

There are some dates in the calendar where either the month or the day number is a single-digit number. If these types of dates are represented by only a seven-digit full date number, either as M1-D1D2-Y1Y2Y3Y4 (because the month of the date under consideration falls between January and September and can be represented with a single-digit number between 1 and 9) or as M1M2-D1-Y1Y2Y3Y4 (because the day number of the date is a single-digit number that lies between 1 and 9), Franklin had many seven-digit palindrome dates in his life.

For example, using the M1-D1D2-Y1Y2Y3Y4 date format (single-digit month number is assumed), a palindrome date falling in the 18th century (in year 17AB since no palindrome date exists in 1800) must be of the form B-A7-17AB where digit B is the month number that can only take nine values (1 to 9) and digit A, which is the tenth digit of the day number, is either 0, or 1, or 2, since the day number A7 cannot exceed 30 or 31 (or 28 or 29 if February). So, 9 x 3 = 27 such palindrome dates occurred in the 18th century:

1-07-1701, 2-07-1702, 3-07-1703, 4-07-1704, 5-07-1705, 6-07-1706, 7-07-1707, 8-07-1708, 9-07-1709

1-17-1711, 2-17-1712, 3-17-1713, 4-17-1714, 5-17-1715, 6-17-1716, 7-17-1717, 8-17-1718, 9-17-1719

1-27-1721, 2-27-1722, 3-27-1723, 4-27-1724, 5-27-1725, 6-27-1726, 7-27-1727, 8-27-1728, 9-27-1729

These 27 palindrome dates expressed

continued on p.5

in the date format B-A7-17AB all occurred between the months of January and September, 9 of them on the 7th day, 9 on the 17th day, and the last 9 on day 27 of each month. Note that since Franklin was born on January 17, 1706, the first five of these palindrome dates (January 07, 1701, February 07, 1702, March 07, 1703, April 07, 1704 and May 07, 1705) occurred before his birth. Therefore, the first palindrome date in Franklin's life was June 07, 1706 (6-07-1706), which occurred when he was only 141 days old. Also, Franklin's 5th birthday, which took place on January 17, 1711 was indeed a palindrome date represented as 1-17-1711.

In the M1M2-D1-Y1Y2Y3Y4 date format (single-digit day number is assumed), a palindrome date in the 18th century would be of the form BA-7-17AB where number BA represents the month number of the date and the day number is always equal to 7. Since BA can vary between 01 and 12, a dozen such palindrome dates exist in the 18th century:

10-7-1701, 01-7-1710, 11-7-1711, 02-7-1720, 12-7-1721, 03-7-1730, 04-7-1740, 05-7-1750, 06-7-1760, 07-7-1770, 08-7-1780, 09-7-1790

Note that all twelve of these palindrome dates in the BA-7-17AB date format occurred on day 7 of each month. Also note that the first and the last of these palindrome dates, 10-7-1701 (October 7, 1701) and 09-7-1790 (September 7, 1790), occurred outside Franklin's life span since he died on April 17, 1790.

So, based on the seven-digit full date format (interpreted either as M1M2-D1-Y1Y2Y3Y4 or M1-D1D2-Y1Y2Y3Y4), the 18th century had a total of 39 palindrome dates, the first one being January 07, 1701 (1-07-1701) and the last one September 7, 1790 (09-7-1790). Among these palindrome dates, years 1701, 1711, and 1721 had double palindrome dates occurring in each: January 07 and October 7 occurred in 1701 (1-07-1701 and 10-7-1701); January 17 and November 7 in 1711 (1-17-1711 and 11-7-1711); and January 27 and December 7, 1721 (1-27-1721 and 12-7-1721). Only 32 of the 39 palindrome dates in the 18th century coincide with Franklin's life, the last one being August 7, 1780 (08-7-1780).

Eight-Digit Palindrome Dates in Most Other Countries:

It's interesting to note that most other countries in the world write full eight-digit date numbers with the day number preceding the month number as in the form D1D2-M1M2-Y1Y2Y3Y4, and this date format has a completely different set of palindrome dates. For example, based on the D1D2-M1M2-Y1Y2Y3Y4 date format, this (21st) century has a total of 29 palindrome dates. The first and second occurred on 10 February 2001 (since that date is 10-02-2001) and 20 February 2002 (20-02-2002). The third palindrome date of this century happened early this year on February 01, 2010 (01-02-2010). The next three will be 11 February 2011 (11-02-2011), 21 February 2012 (21-02-2012) and 02 February 2020 (02-02-2020). The last (29th) palindrome date of this century happens to be a leap day to occur on 29 February 2092 (29-02-2092). Note that all palindrome dates in this century occur in the month of February. Also, 31 more palindrome dates exist in the 22nd palindrome century, all to occur in December with the last one being 29 December 2192 (29-12-2192), and no more after that until the end of the third millennium.

In the D1D2-M1M2-Y1Y2Y3Y4 date format, the second millennium had a total of 61 palindrome dates and all occurred during the 11th and 12th centuries. The last palindrome date of the second millennium happened 818 years ago on 29 November 1192 (29-11-1192) and after that, no palindrome dates existed between the 13th and 20th centuries. Although Franklin was exposed to this date format as he spent a significant part of his life in Europe, since he lived during the 18th century, again, no eight-digit palindrome dates coincided with his life. (An eight-digit palindrome date in the 18th century in year 17AB would have to be of the form BA-71-17AB and this number is not a valid date simply because 71 is not an acceptable month number.) However, Franklin's life included many seven-digit palindrome dates in this date format as well.

More Seven-Digit Palindrome Dates in Franklin's Life:

Based on the seven-digit date format given as D1-M1M2-Y1Y2Y3Y4 (assuming the day number is single digit), a palindrome date in the 18th century (in year 17AB) would have the general form B-A7-17AB where digit A has to be zero since the month number cannot exceed 12. In this date format, the 18th century had nine palindrome dates occurring in the first nine years, one per year and all falling in the month of July:

1-07-1701, 2-07-1702, 3-07-1703, 4-07-1704, 5-07-1705, 6-07-1706, 7-07-1707, 8-07-1708, 9-07-1709

Among these palindrome dates, only the last four happened during Franklin's life, the first one being 6 July 1706 (6-07-1706), when he was 170 days old.

Using the seven-digit D1D2-M1-Y1Y2Y3Y4 date format (where the month number is assumed to be single digit), a palindrome date in year 17AB would have the general form as BA-7-17AB which is a date that always falls in July where BA represents the day number and could take any value between 01 and 31. Therefore, based on this date format, the 18th century had 31 palindrome dates, all happening in July:

10-7-1701, 20-7-1702, 30-7-1703, 01-7-1710, 11-7-1711, 21-7-1712, 31-7-1713, 02-7-1720, 12-7-1721

22-7-1722, 03-7-1730, 13-7-1731, 23-7-1732, 04-7-1740, 14-7-1741, 24-7-1742, 05-7-1750, 15-7-1751

25-7-1752, 06-7-1760, 16-7-1761, 26-7-1762, 07-7-1770, 17-7-1771, 27-7-1772, 08-7-1780, 18-7-1781

28-7-1782, 09-7-1790, 19-7-1791, 29-7-1792

Note that only 25 of these 31 palindrome dates occurred during Franklin's life. Also, note that one of these palindrome dates, 17 July 1771 (17-7-1771) occurred in palindrome year 1771.

So, based on the date format used in most other countries and using seven-digit date numbers (provided either as D1-M1M2-Y1Y2Y3Y4 or D1D2-M1-Y1Y2Y3Y4), there were a total of 40 palindrome dates in the 18th century, all occurring in the month of July, the first one being 1 July 1701 (1-07-1701) and the last one 29 July 1792 (29-7-1792). The first three years of the century had double palindrome dates in each: 1 July and 10 July 1701 (1-07-1701 and 10-7-1701); 2 July and 20 July 1702 (2-07-1702 and 20-7-1702); and 3 July and 30 July, 1703 (3-07-1703 and 30-7-1703). Only 29 of the 40 palindrome dates in the 18th century coincided with Franklin's life, the last one occurring on 28 July 1782 (28-7-1782).

Franklin had numerous seven-digit palindrome dates in his life in both date formats, 32 in the month-day-year and 29 in the day-month-year date format, total 59 since two palindrome dates in each format (7-07-1707 and 07-7-1770) overlap. It would be interesting for the reader to check each one of these palindrome dates and determine where Franklin was on each: whether he was in America, Europe, or traveling from one to the other.

References:

[1] A. S. Inan, "Twelve Palindrome Dates in 21st Century," The Beacon, Vol. 111, Issue No. 11, p. 11 & 13, University of Portland, Portland, Oregon, November 19, 2009.

[2] A. S. Inan, "Palindrome Dates in Four-Digit Years," accepted for publication in Pi in the Sky, Issue # 14, Pacific Institute for Mathematical Sciences (PIMS), Vancouver, British Columbia, Canada, Fall 2010.