**Solutions to Quiz # 5 for Dr. Z.'s Number Theory**

**1.** (5 points) Using divisiblity tests, determine whether 517286 is divisible by 11.

**Sol. of 1**: We take the *alternating sum*

$$5 - 1 + 7 - 2 + 8 - 6 \ (mod \ 11) = 4 + 5 + 2 \ (mod \ 11) = 11 \ (mod \ 11) = 0 \quad .$$

So it is divisible by 11.

**2.** (5 points) What is the day of the week of Halloween 2100.

**Sol. of 2**: This year Oct. 31 is Thurs. so it is Day 5.

Oct. 31, 2100 will happen in 2100-2024=76 years. There are $(2096 - 2024)/4 = 18$ leap days (Feb, 29) until then. Note that 2100 itself is **not** a leap year, since it is a multiple of 100 (and not a multlple of 400).

So we have
$$5 + 76 + 18 \ (mod \ 7) = 5 + 6 + 4 \ (mod \ 7) = 1 \ (mod \ 7) \quad .$$

**Ans. to 2**: Sunday.