Across this text, \( a/b \) means remainder of \( a \) when divided by \( b \).

**Problem 3.**

\( n = 11m + 9 \) where \( m \) is a nonnegative integer. We will look at the remainder of \( n/33 \) depending on the remainder of \( m/3 \).

- **case 1:** \( m \) is divisible by 3, i.e. \( m = 3k \) where \( k \) is a nonnegative integer. Then \( 11m = 33k \) will be divisible by 33, so \( n/33 \) will have remainder 9.

- **case 2:** \( m \) has remainder 1 when divided by 3, i.e. \( m = 3k + 1 \) where \( k \) is a positive integer. Then \( n = 11(3k + 1) + 9 = 33k + 20 \) will have remainder 20 when divided by 33.

- **case 3:** \( m \) has remainder 2 when divided by 3, i.e. \( m = 3k + 1 \) where \( k \) is a nonnegative integer. Then \( n = 11(3k + 2) + 9 = 33k + 31 \) will have remainder 31 when divided by 33.

We can conclude that 9, 20, 31 are the only possible remainders. But we also have that \( n \) has remainder 2 when divided by 3. Since 33 is divisible by 3, the remainder when divided by 3 will be the same as remainder when divided by 33. In the above three cases, the remainders are 9, 20 and 31. The only one has remainder 2 when divided by 3 is \( 20 = 3 \times 6 + 2 \). So 20 is the only possible remainder of \( n/33 \).