# Exercise 77

**Repeating Decimal** Express each repeating decimal as a fraction. (See the margin note on page 3.)

(a)  $0.\overline{7}$  (b)  $0.2\overline{8}$  (c)  $0.\overline{57}$ 

#### Solution

#### Part (a)

Let  $x = 0.777 \cdots$ . Then

 $100x = 77.777 \cdots$  $10x = 7.777 \cdots$ 

Subtract the respective sides of these equations.

Solve for x.

 $x = \frac{70}{90} = \frac{7}{9}$  $0.\overline{7} = \frac{7}{9}.$ 

90x = 70

### Part (b)

Therefore,

Let  $x = 0.2888 \cdots$ . Then

100x	=	$28.888\cdots$	
10x	=	$2.888 \cdots$ .	

Subtract the respective sides of these equations.

90x = 26

Solve for x.

$$x = \frac{26}{90} = \frac{13}{45}$$

Therefore,

$$0.2\bar{8} = \frac{13}{45}.$$

## Part (c)

Let  $x = 0.575757 \cdots$ . Then

$$10000x = 5757.5757\cdots$$
  
 $100x = 57.5757\cdots$ 

Subtract the respective sides of these equations.

$$9900x = 5700$$

Solve for x.

$$x = \frac{5700}{9900} = \frac{19}{33}$$

Therefore,

$$0.\overline{57} = \frac{19}{33}.$$