

### “Convert .3636... to a fraction”

- The book’s solution: “put 36 over 99 and reduce the fraction”

$$\frac{36}{99} = \frac{4}{11}$$

- But where did the 99 come from???

### “Convert .3636... to a fraction”

- Read “between the lines” to infer that  
 $.3636... = 0.363636363636...$
- Stick a name on this thing:  
 $x = 0.363636363636...$
- Notice that the repeating group has 2 digits.
- Write a second equation, multiplying by 100  
 $100x = 36.363636363636...$

### “Convert .3636... to a fraction”

- Subtract the first equation from the second:  
 $100x = 36.363636363636...$

$$\underline{-x = -0.363636363636...}$$

$$99x = 36.0$$

- Solve the resulting equation:  $x = \frac{36.0}{99} = \frac{4}{11}$

### Another Example: $0.2745\overline{45}$

- $100x = 27.45\overline{45}$   
 $10000x = 2745.4545$   
 $9900x = 2718.0$

$$x = \frac{2718}{9900} = \frac{906}{3300} = \frac{302}{1100} = \frac{151}{550}$$

$$\text{check: } \frac{151}{550} = 0.27454545454546 \text{ (Excel)}$$

- This technique of subtracting one equation from another will be used later, to solve “simultaneous equations” such as:

$$0.7x + 0.9y = 2.58$$

$$2.0x + 1.5y = 5.55$$