

1. Convert  $0.\overline{62}$  to the form  $\frac{a}{b}$ , with  $a$  an integer, and  $b$  a natural number.

*Solution.* Let  $x = 0.\overline{62}$ . Then  $100x = 62.\overline{62} \implies 99x = 100x - x = 62.\overline{62} - 0.\overline{62} = 62 \implies x = \frac{62}{99}$ .

2. Between the terminating decimals 1.5 and 1.6, find an irrational number.

*Solution 1.* Define  $x = 1.5x_{-2}x_{-3}x_{-4}x_{-5}x_{-6}\cdots$  where  $x_{-j}$  is any number chosen at random.

*Solution 2.* We know that  $x = \sqrt{2} = 1.4142135\cdots$  is irrational. Then  $x + .1 = \sqrt{2} + .1 = 1.4142135\cdots + .1 = 1.5142135\cdots$  is an irrational between 1.5 and 1.6.

*Solution 3.*  $1.5^2 = 2.25$  and  $1.6^2 = 2.56$ . Since  $2.25 < 2.4 < 2.56$ , we then have that  $x = \sqrt{2.4}$  is irrational and satisfies  $1.5 < x < 1.6$ .

*Solution 4.*  $\frac{\sqrt{2}}{100} \approx 0.014142135\dots$ . So  $1.5 < 1.5 + \frac{\sqrt{2}}{100} \approx 1.5014142135\dots < 1.6$ . Thus,  $x = 1.5 + \frac{\sqrt{2}}{100}$  is irrational and satisfies  $1.5 < x < 1.6$ .

3. Brandy received a 10 % raise last year. If her salary is now \$ 60,000, what was her salary last year?

*Solution.* Let  $x$  be Brandy's salary last year. Then  $x$  is to %100, whereas 60,000 is to  $100\% + 10\% = 110\%$ . Thus

$$x \iff 100$$

$$60,000 \iff 110$$

Thus

$$x = \frac{60,000 * 100}{110} = 54,545.50$$

Her salary last year was about \$ 54,545.50.

4. Find the equation of the straight line passing through the points (32, 0) and (50, 10).

*Solution.* We know that the slope-point equation of a line is given by

$$y - c = m(x - a),$$

where  $m$  is the slope and  $(a, c)$  is any point. So, we need the slope:

$$m = \frac{10 - 0}{50 - 32} = \frac{10}{18} = \frac{5}{9}.$$

And with (32, 0), we get

$$y - 0 = \frac{5}{9}(x - 32)$$

5. What is  $68^\circ$  Fahrenheit in Celsius? [Hint: use last problem.]

*Solution.* Using the hint, and our knowledge from the handout,  $x = 68$  yields

$$y = \frac{5}{9}(68 - 32) = \frac{5}{9}(36) = \frac{5 * 36}{9} = \frac{5 * 4 * 9}{9} = 20,$$

or 20 Celsius.

6. What year did the US enter 2nd World War? *Solution.* December 7, 1941.

7. Why? [Two words] *Solution.* Pearl Harbor.