Math 5e, Spring 2026 Homework 16

Due January 19

Instructions: Some of the problems we solved in class, and some are new. Please try to solve all problems, do your best, and show your work. Write on separate sheets of paper, not between the lines of this handout!

Binary Numbers: Numbers represented by using only 0s and 1s.

The square root of ***a*** is a number whose square is equal to a. For example, the square root of 25 is 5 because $5^2 = 25$. The square root of a number, a, is commonly denoted as $\sqrt{a}$.

Similarly to $(ab)^n = a^n b^n$, $\sqrt{ab} = \sqrt{a}\sqrt{b}$.

For example, $\sqrt{36} = \sqrt{9 \times 4} = \sqrt{9} \times \sqrt{4} = 3 \times 2 = 6$, which is the same as $\sqrt{36} = 6$.

Theorem (Pythagorean theorem). In a right triangle with legs(sides) *a, b,* and hypotenuse *c*, one has:

$$a^2 + b^2 = c^2$$

$$c = \sqrt{a^2 + b^2}$$

For example, in a square with a side of 1 unit, the diagonal has a length of $\sqrt{2}$.

It is possible – but not easy – to find a right triangle where all the sides are whole numbers. The easiest such triangle is one with a, b, c = 3, 4, 5.

Homework problems

1. Find the following square roots: If you cannot find the number exactly, at least say between which two whole numbers the answer is (e.g. between 5 and 6)

   (a) $\sqrt{49}$ (c) $\sqrt{225}$ (e) $\sqrt{64}$

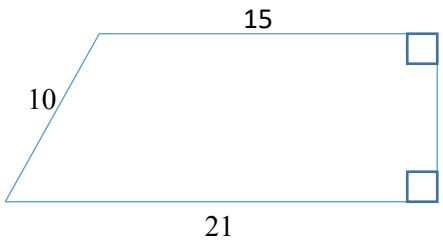
   (b) $\sqrt{169}$ (d) $\sqrt{121}$ (f) $\sqrt{8}$

2. Can you find a right triangle with all sides whole numbers and a hypotenuse of 13?

3. If, in a right triangle, one leg has length 1unit and the hypotenuse has length 2 units, what is the other leg?

4. In a triangle, if one leg is 6 cm and the other is 8 cm, what is the hypotenuse?

5. Find the height and area of the figure if the three sides are given and the two marked angles are right angles.



6. Find the following square roots. If you cannot find the number exactly, at least say between which two whole numbers the answer is, e.g., between 5 and 6.
   (a) $\sqrt{91+9}$
   (b) $\sqrt{42+2}$
   (c) $\sqrt{36}+\sqrt{49}$
   (d) $\sqrt{49}-\sqrt{144}$
   (e) $\sqrt{11^2}$
   (f) $\left(\sqrt{11}\right)^2$

For the following two problems, write equations to solve!

7. A watermelon is three times as expensive as a honeydew. Joe can buy 2 watermelons and have 7 dollars left, or he can buy 4 honeydews and have 13 dollars left. How much does the honeydew cost? How much is the watermelon?

8. Yesterday, Peter came to the store and gave the cashier 11 dollars for 3 pounds of grapes; he received some change back. The next day, Peter went to the same store again and gave the cashier 15 dollars for 5 pounds of grapes. He again received some change. How much does each pound of grapes cost if the change he received is the same on both days?