

Homework 1: Algebra Check

(due January 25)

Math 130 Kovitz 2018

For this assignment, and the next homework also, please work alone. You may use a calculator and any algebra text, but do not seek help from another person. This is not a major part of your course grade, but it is an important diagnostic that will enable us to customize some work to improve your algebra, if needed.

On homework assignments starred problems are either more difficult, somewhat advanced, or less important. Doubly starred problems are even more difficult.

1. Factor completely.

$$100ab^3 - 36a^3b$$

2. Divide and simplify the result:

$$(a) \ x^2/4 \div 4/x^2 \quad (b) \ \frac{1/2}{\sqrt{3}/2} \quad (c) \ \frac{x/3}{x/y} \quad (d) \ \frac{9\left(\frac{x}{2}\right)}{\left(\frac{x}{2}\right)^2}$$

3. Simplify: $\frac{-10 \pm 34\sqrt{7}}{-2}$.

4. How is $\sqrt{14}/2$ related to $7/\sqrt{14}$?

5. Add or subtract, then simplify.

$$\frac{x^2 - 3x}{x - 5} + \frac{25 - 3x}{5 - x} \quad (\text{Don't work too hard; there's a trick.})$$

6. Subtract $2x^2 - 3x - 5$ from $x^2 - 7x + 1$.

Be careful. *Which is the expression being subtracted? From what it is being subtracted?*

7. Multiply this expression by -1 and then simplify. Leave your answer in factored form but with no minus signs outside the parentheses. Keep it in terms of π and $\sqrt{5}$; do not get approximate decimal values.

$$(1 - \sqrt{5})(\pi - 5)$$

Reasonableness check: Was the original expression positive or negative? Was your final answer positive or negative? Is this what we wanted?

8. Solve for x .

$$x + \frac{z - \sqrt{2}}{\pi - 1} = 0.$$

Give answer in the simplified form $\frac{a-b}{c-d}$, where a , b , c , and d are real numbers or variable letters.

9. Simplify.

$$|x| - |-x|$$

TURN OVER for Problems 10–20

10. Multiply out and simplify.

$$2(x - 1/2)^2 - 1$$

11. Solve, using the quadratic formula. Then simplify and get the exact answer in radical form; we do not prefer an approximate decimal.

$$x^2 + 6x + 3 = 0$$

12. Solve, using the quadratic formula,

$$ax^2 + bx + c = 0$$

given that $a = -1$, $b = 4$, and $c = -1$. Simplify the result in radical form.

13. Find $\sqrt{1 - u^2}$ when:

(a) $u = 0.8$, which is $\frac{4}{5}$.

(b) $u = -0.96$, which is $-\frac{24}{25}$.

14. Let a be a non-zero real number. How are $-a^2$ and $(-a)^2$ related?

Are $-a^2$ and $(-a)^2$ equal? If not, which of them will be positive and which of them will be negative?

15. Substitute $3(2 + h) - 6$ for v and $2h^2 - 5h$ for w in the expression $\frac{v - w}{h}$, and then simplify the result as much as possible.

16. Substitute $-x$ for x and $-y$ for y in the equation

$$y^4 = 7x - 3x^2 - 4x^3$$

and simplify the result. Is the result equivalent to

$$(-y)^4 = -7x - 3x^2 + 4x^3?$$

17. Solve for x .

(a) $1 = -.2 + 2.4x$

(b) $1.4 = \frac{x}{x - 20}$

18. Solve for x .

(a) $\sqrt{2} - 2x = 2x$

(b) $(\sqrt{2} - 2)x = 2x$

(c) $\sqrt{2} - 2x = 2$

(d) $(\sqrt{2} - 2)x = 2$

19. Solve for q : $(q - 625)^2 = 25$.

How many solutions did you find to this equation?

20. The total of two numbers is one hundred and three. One of them is seventeen less than three times the other. Find both numbers.

Reminder: I will assume that you can do most of these problems, from a basic algebra course such as Math 115, without the least bit of difficulty. If not, please practice the techniques.