

# Homework 9: Exponent Check

(due March 23, along with HW8)

Math 130 *Kovitz* 2020

For this assignment, as with the previous one, 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. Find: (a)  $4^0$ , (b)  $4^{-2}$ , (c)  $4^{2.5}$ , (d)  $4^{1/8}$ , (e)  $4^{-3/2}$ .

2. Let  $y = 9^x$

(a) Find  $y$  when  $x =$ : 0, 1,  $\frac{1}{2}$ ,  $\frac{3}{2}$ , 2, 2.5,  $-2$ .

(\*b) For which  $x$  is  $y$  equal to: 81, 27, 9, 1,  $\sqrt{3}$ ,  $\frac{1}{9}$ , 0,  $-9$ ?

3. True or False?

(a)  $a^{xy} = a^x + a^y$ .

(b)  $a^{\frac{x}{y}} = \sqrt[y]{a^x}$ .

(c)  $\frac{a^x}{a^y} = a^{x-y}$ .

(d)  $a^{x+y} = a^x \cdot a^y$ .

(e)  $(a^x)^y = a^{xy}$ .

(f)  $1/a^x = (1/a)^x$ .

(g)  $1/a^x = a^{-x}$ .

(h)  $\sqrt[n]{a} = a^{1/n}$ .

(i)  $a^n = (1/a)^{-n}$ .

(j)  $a^{m/n} = \sqrt[n]{a^m}$ .

4. True or false:  $\sqrt{7.6^2 + 2.4^2} = 10$ .

5. Simplify each of the following expressions to a single real number:

$$(-1) \times (-1)^{-1}, \quad (-2) \times (-2)^{-2}, \quad (-3) \times (-3)^{-3}.$$

\*6. If possible, simplify:  $\sqrt{1-9x^2}$  (over the real numbers only).

\*\*7. Find an expression without a radical for  $\sqrt{\pi^2 - 10\pi + 25}$ .

Find the exact answer in terms of  $\pi$ , then convert it to decimal form.

Does your answer have the proper sign? If not, what went wrong?

8. Find  $(-8)^{-4/3}$ .

\*\*9. Simplify

$$\frac{\sqrt{100-x^2}}{\sqrt{10-x}}.$$

For which  $x$  is the expression written above (not your simplified answer) defined as a real number?

(Answer by giving a range of real numbers: an interval on the real-number line.)

10. Solve for  $x$ :  $x^3 = 27/8$ ,  $x^2 = 9$ ,  $x^4 = 7$ .

11. Simplify the expressions  $10(3/2.5)^2$  and  $[10(3/2.5)]^2$ . Are they equal?

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.