

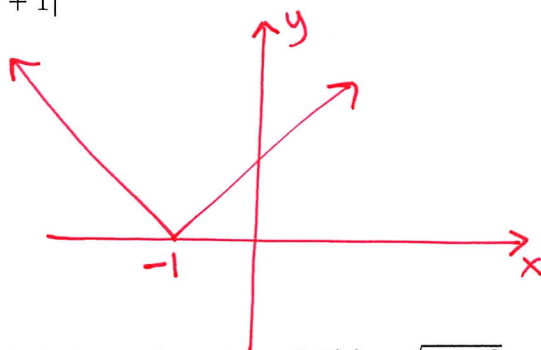
Name: ANSWERSInstructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

1. Complete the following rules:

(a)  $x^a \cdot x^b = x^{a+b}$  (b)  $x^{a/b} = \sqrt[b]{x^a}$  (c)  $x^{-n} = \frac{1}{x^n}$  (d)  $\frac{x^a}{x^b} = x^{a-b}$

(e)  $a^2 - b^2 = (a-b)(a+b)$  (f)  $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$$\begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

2. Define:  $|x| =$  \_\_\_\_\_3. Sketch:  $y = |x + 1|$ 4. State the domain, in interval notation, of  $f(x) = \sqrt{9 - x^2} + x^{-1/4}$ .  $dom(f) = (0, 3]$ 

5. Simplify/combine as appropriate, you may leave negative powers in your answer:

(a)  $\left(\frac{a^3 b^{-2} c^{-1}}{3 a^7 b^5 c^{-2}}\right)^2 \left(\frac{2 a^5 b^{-3} c^2}{5 a^{-2} b^4 c^{-2}}\right)^{-2} = \frac{25}{36} a^{-22} b^{-6}$  (b)  $|a|\sqrt{8ab^2c^3} - |ab|\sqrt{18a^3c} = \frac{2|abc|\sqrt{2ac} - 3a^2|b|\sqrt{2ac}}$

6. Factor:  $x^3 + x^2 - 9x - 9 = (x+1)(x-3)(x+3)$ 

Bonus (after attempting the problems above, do these for extra credit):

1. Reduce to lowest terms:  $\frac{y^4 - 16}{2 - y} = -(y+2)(y^2+4)$ 2. Factor completely:  $6x^{7/3} - x^{4/3} - 2x^{1/3} = x^{1/3}(2x+1)(3x-2)$ 3. Expand:  $(x-1)^3 = x^3 - 3x^2 + 3x - 1$