Wksht 1 Solns

1. $x < 0$, $y > 0$

a. $\frac{x}{y} = \frac{neg}{pos} =$ **negative**

b. $\frac{x-y}{xy} = \frac{neg}{neg} =$ **positive**

c. $neg \cdot pos =$ **negative**

2. a. **$b > 0$**

b. **$a \leq 0$** (0 is not positive or negative)

c. **$x \geq -4$**

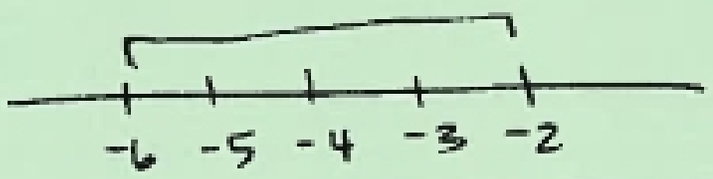
d. $n \not> 2$ means **$n \leq 2$**

e. $\frac{1}{m}$ = reciprocal of m so **$\frac{1}{m} \leq 14$**

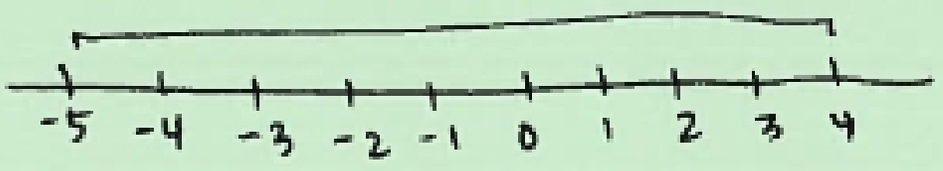
3. a. $|-5+1| = |-4| =$ **4** (using abs. value defn. $-(-4) = +4$)

b. $|7| - |-1|$
$= 7 - 1 =$ **6**

c. $\left|\frac{1}{4} - \frac{1}{3}\right|$
$= \left|\frac{3}{3}\cdot\frac{1}{4} - \frac{1}{3}\cdot\frac{4}{4}\right|$
$= \left|\frac{3}{12} - \frac{4}{12}\right|$
$= \left|-\frac{1}{12}\right| =$ **$\frac{1}{12}$**

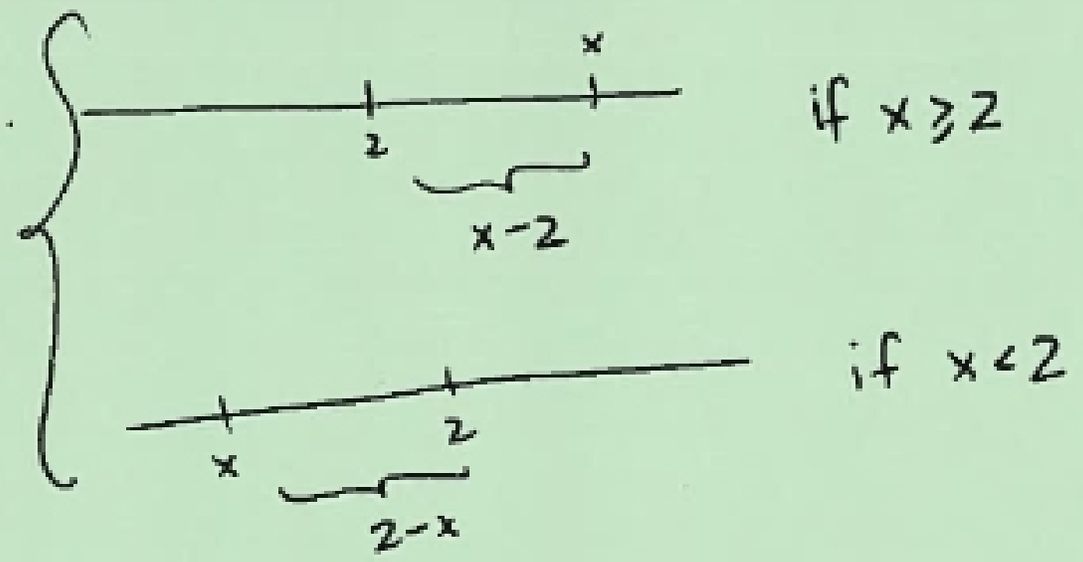
4. a. 

4 (using distance defn: $= |-6-(-2)| = |-6+2| = |-4| = 4$)

b. 

$= 5+4 =$ **9** (using distance defn: $= |4-(-5)| = |9| = 9$)

4c.



using distance definition = $\boxed{|x-2|}$

5a. $|5-x|$ if $x > 5$

then $5-x < 0$

the thing in abs. value is negative.

By definition, to get a positive answer, multiply by -1.

$= -(5-x)$

$= \boxed{x-5}$

b. $|a-b|$ if $a \le b$

then $a-b \le 0$ then $|a-b| = -(a-b)$

$= \boxed{b-a}$

b. a. $(-2u^2w^{-5})^3 (7u^4w^6)$

$= (-2)^3 (u^2)^3 (w^{-5})^3 \cdot 7 \cdot u^4 \cdot w^6$ distribute exponent over multiplication

$= -8\ u^6\ w^{-15}\ 7\ u^4\ w^6$ $(x^n)^m = x^{n \cdot m}$

$= -8 \cdot 7 \cdot u^6 \cdot u^4 \cdot w^{-15} \cdot w^6$ (can multiply in any order)

$= \boxed{-56\ u^{10}\ w^{-9}}$

b. $\left(\frac{3x^{-1}y^8}{2x^7y^5}\right)^{-4}$

$= \left(\frac{3x^{-1-7}y^{8-5}}{2}\right)^{-4}$

$= \left(\frac{3x^{-8}y^3}{2}\right)^{-4}$

$= \left(\frac{3y^3}{2x^8}\right)^{-4}$

$= 3^{-4} \cdot (x^{-8})^{-4} (y^3)^{-4}$

$= \frac{1}{3^4} x^{32} y^{-12} \cdot 2^4 / 2^{-4}$

$= \frac{1}{3^4} x^{32} \frac{1}{y^{12}} \cdot 2^4$

$= \boxed{\frac{16x^{32}}{81y^{12}}}$

6b $\left(\frac{3x^{-1}y^8}{2x^7y^5}\right)^{-4}$

$= \left(3 \cdot 2^{-1} \cdot x^{-1-7} \cdot y^{8-5}\right)^{-4}$

$= \left(3 \cdot 2^{-1} \cdot x^{-8} \cdot y^3\right)^{-4}$

$= 3^{-4} \cdot (2^{-1})^{-4} \cdot (x^{-8})^{-4} \cdot (y^3)^{-4}$

$= \frac{1}{3^4} \cdot 2^4 \cdot x^{32} \cdot y^{-12}$

$= \frac{1}{3^4} 2^4 \cdot x^{32} \cdot \frac{1}{y^{12}}$

$= \boxed{\frac{16x^{32}}{81y^{12}}}$

other methods are fine.

6c. $-3^2 + (-3)^2 + 3^{-2}$

$= -9 + 9 + \frac{1}{3^2}$

$= 0 + \frac{1}{9}$

$= \boxed{\frac{1}{9}}$

7. a. $\boxed{5^{2/3}}$

b. $\boxed{(a+b)^{1/2}}$

8. a. $3 + \sqrt[3]{y^5}$

b. $\left(\frac{s^{1/2}\, t^{2/5}}{s^{1/3}\, t^{-3}}\right)^{1/3}$

$= \left(s^{1/2 - 1/3}\, t^{2/5 - -3}\right)^{1/3}$

$= \left(s^{\frac{3}{6} - \frac{2}{6}}\, t^{2/5 + 15/5}\right)^{1/3}$

$= \left(s^{\frac{1}{6}}\, t^{17/5}\right)^{1/3}$

$= s^{1/18}\, t^{17/15}$

$= \boxed{\sqrt[18]{s}\ \sqrt[15]{t^{17}}}$

9. a. $\sqrt[3]{\frac{x^0 y^4}{3z^3}} \cdot \sqrt[3]{81x^9 y^{-10} z^6}$

$= \sqrt[3]{\frac{y^4}{3z^3} \cdot \frac{81x^9 z^6}{y^{10}}}$

$= \sqrt[3]{\frac{81x^9 y^4 z^6}{3y^{10} z^3}}$

$= \sqrt[3]{\frac{27x^9 z^3}{y^6}}$

$= \frac{\sqrt[3]{27}\ \sqrt[3]{x^9}\ \sqrt[3]{z^3}}{\sqrt[3]{y^6}}$

$= \boxed{\frac{3x^3 z}{y^2}}$

aside:
$\sqrt[3]{y^6} = y^{6/3}$
$= y^2$

9b. $3\sqrt{40} + \sqrt{250}$

$= 3\sqrt{4 \cdot 10} + \sqrt{25 \cdot 10}$

$= 3\sqrt{4}\sqrt{10} + \sqrt{25}\sqrt{10}$

$= 3 \cdot 2\sqrt{10} + 5\sqrt{10}$

$= 6\sqrt{10} + 5\sqrt{10}$

$= \boxed{11\sqrt{10}}$

$40 = 4 \cdot 10$
$= 2 \cdot 2 \cdot 2 \cdot 5$

$250 = 25 \cdot 10$
$= 5 \cdot 5 \cdot 2 \cdot 5$