Math 12 – Workshop #16

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1. (a) What is the definition of $\sqrt[3]{2}$?

   (b) Suppose a is a real number, how do we define $\sqrt[3]{a}$?

   (c) Use the rules of exponenets to show that it makes sense to write $x^{\frac{1}{3}}$ as $\sqrt[3]{x}$. Your explanation must be good enough to convince your facilitator.

2. Is $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$ always true? Choose numbers a and b to support your answer.

3. Write $x^{-\frac{1}{2}}$ in at least four different, but equivalent ways.

4. Compute $(4^3)^{\frac{1}{2}}$ and $(4^{\frac{1}{2}})^3$ by hand. Which is easier?

5. Compute the following without a calculator. Use the Super Helpful Property to make your life easier.

   (a) $16^{\frac{3}{2}}$

   (b) $8^{\frac{2}{3}}$

   (c) $\left(\frac{25}{4}\right)^{-\frac{3}{2}}$

   (d) $3^{\frac{1}{3}} \cdot 3^{\frac{2}{3}}$

   (e) $4^{\frac{1}{4}} \cdot 2^{\frac{6}{4}}$

6. Simplify the following

   (a) $(125z^3)^{2/3}$

   (b) $[(x+1)^2]^{1/2}$

7. Simplify the following with only positive exponents. Assume all variables are positive

   (a) $x^4 \cdot x^2$

   (b) $x^{3/2} \cdot x^{5/7}$

   (c) $(a^3)^2$

   (d) $(a^{2/3})^{3/4}$

8. Simplify the following with only positive exponents. Assume all variables are positive

   (a) $\frac{z^4}{z^2}$

   (b) $\frac{z^{3/2}}{z^{5/7}}$

   (c) $(w^3y^{-3})^2$

   (d) $(w^{3/5}y^{1/7})^3$

9. Multiply the following and simplify the exponents

   (a) $(x^3 + 3x^2 - 1) \cdot x^{-1/2}$

   (b) $y^{3/5} \cdot (y^{2/5} + y^{1/5} - y^{-3/5})$

   (c) $(x^{1/2} + y^{3/2})^2$

10. Simplify the following

    (a) $\sqrt{7}\sqrt{7}$

    (b) $\sqrt[3]{13}\sqrt[3]{13}\sqrt[3]{13}$

    (c) $\sqrt[3]{3}\sqrt[3]{9}$

    (d) $\sqrt{2700}$

11. Simplify the following assume all variables are positive values

(a) $\dfrac{\sqrt{32a^5}}{\sqrt{2a}}$

(b) $\sqrt{\dfrac{5x}{16z^4}}$

(c) $\sqrt[3]{\dfrac{7a^3}{64}}$

(d) $\sqrt[3]{\dfrac{26b^{-3}}{y^6}}$

12. Suppose that $\sqrt{2y^7} = 1.1$. Without using a calculator, evaluate

$$\sqrt{8y^7} + \sqrt{32y^7} - \sqrt{2y^7}$$

13. Simplify the following

(a) $\sqrt{288} - \sqrt{98}$

(b) $\sqrt[3]{xy^4} + \sqrt[3]{8xy^4} - \sqrt[3]{27xy^4}$