

Math 220 – Exponent Review and Practice Sheet (Answers Below)

I. Evaluate the following:

1. $32^{\frac{4}{5}}$ 2. 17^0 3. $8^{-\frac{1}{3}}$ 4. $4^{\frac{3}{2}}$ 5. $100^{\frac{1}{2}} - 64^{\frac{1}{2}}$ 6. $(100 - 64)^{\frac{1}{2}}$ 7. -3^2

II. Change the following to exponential form (eliminate the radical sign):

1. $\sqrt[3]{x^5}$ 2. $(\sqrt[5]{2x})^3$ 3. $\left(\sqrt{\frac{x}{y^3}}\right)^5$ 4. $\frac{x}{\sqrt[5]{x^3}}$ 5. $\sqrt[6]{\sqrt[3]{x^4}}$

III. Change the following to radical form:

1. $x^{\frac{1}{3}}$ 2. $-x^{\frac{1}{2}}$ 3. $(-x)^{\frac{1}{2}}$ 4. $x^{\frac{2}{5}}$ 5. $-3x^{\frac{2}{3}}$ 6. $2(xy)^{-\frac{3}{4}}$

IV. For which values of x is each of the following defined?

1. \sqrt{x} 2. $\sqrt{-x}$ 3. $\sqrt{x^2}$ 4. $\frac{1}{\sqrt{x}}$ 5. $\sqrt{x-6}$ 6. $\sqrt{6-x}$ 7. $\sqrt[3]{x}$

V. Which expressions, if any, are equivalent to $\sqrt{(-x)^5}$?

(a) $x^{-\frac{5}{2}}$ (b) $(-x)^{\frac{5}{2}}$ (c) $-x^{\frac{5}{2}}$ (d) $(-x)^{\frac{5}{2}}$ (e) $-\sqrt{x^5}$ (f) $\sqrt{-x^5}$ (g) $(\sqrt{-x})^5$

VI. Rewrite so that you only have positive exponents. Simplify.

1. $(x^{\frac{1}{2}})^{-\frac{1}{3}}$ 2. $\left(\frac{3x}{y}\right)^{-2}$ 3. $x^{\frac{1}{2}} \cdot x^{-\frac{2}{3}}$ 4. $(-xy^{-2})^4$ 5. $-(x^{-4}y)^4$

6. $\frac{(xy^2)^3 z^2}{x^3 y^{-2} z}$ 7. $(x^2 y^{-5}) \left(\frac{3x^{-2} z^4}{y}\right)$ 8. $\frac{x^2 y^{-5} z}{x^{-4} y z^3}$ 9. $\sqrt[3]{\frac{x \cdot x}{y^{-2}}}$ 10. $\sqrt{x^{-7}}$

11. $\left(\frac{x^{m^2}}{x^{2m-1}}\right)^{\frac{1}{m-1}}$ where m is a constant and $m > 1$

12. $\left(\frac{x^m y^{-n}}{x^m}\right)^m$ where m, n are positive constants

13. $\left(\frac{a^{-2}}{b^{-2}} + \frac{b^{-2}}{a^{-1}}\right)^{-1}$

VII. Rewrite each expression into radical form. Simplify when possible.

1. $\left(\frac{x^6 y}{z^3}\right)^{\frac{1}{2}}$ 2. $\left(\frac{x^2 + y^2}{x^4}\right)^{\frac{1}{2}}$ 3. $\left(\frac{x^3 + y^3}{z^3}\right)^{-\frac{2}{3}}$

Answers:

I. 1. 16 2. 1 3. $\frac{1}{2}$ 4. 8 5. 2 6. 6 7. -9

II. 1. $x^{\frac{5}{3}}$ 2. $(2x)^{\frac{3}{5}}$ 3. $x^{\frac{5}{2}}y^{-\frac{15}{2}}$ 4. $x^{\frac{2}{5}}$ 5. $x^{\frac{2}{9}}$

III. 1. $\sqrt[3]{x}$ 2. $-\sqrt{x}$ 3. $\sqrt{-x}$ 4. $\sqrt[5]{x^9}$ or $(\sqrt[5]{x})^9$

5. $-3\sqrt[3]{x^2}$ or $-3(\sqrt[3]{x})^2$ 6. $\frac{2}{\sqrt[4]{(xy)^3}}$ or $\frac{2}{(\sqrt[4]{xy})^3}$

IV. 1. $x \geq 0$ 2. $x \leq 0$ 3. \Re 4. $x > 0$ 5. $x \geq 6$ 6. $x \leq 6$ 7. \Re

V. b, f, g

VI. 1. $\frac{1}{x^{\frac{1}{6}}}$ 2. $\frac{y^2}{9x^2}$ 3. $\frac{1}{x^{\frac{1}{6}}}$ 4. $\frac{x^4}{y^8}$ 5. $\frac{-y^4}{x^{16}}$ 6. y^8z
7. $\frac{3z^4}{y^6}$ 8. $\frac{x^6}{y^6z^2}$ 9. $(xy)^{\frac{2}{3}}$ 10. $\frac{1}{x^{\frac{7}{2}}}$ 11. x^{m-1} 12. $\frac{1}{y^{mn}}$

13. $\frac{a^2b^2}{a^3+b^4}$

VII. 1. $\frac{x^3}{z} \sqrt{\frac{y}{z}}$ 2. $\frac{\sqrt{x^2+y^2}}{x^2}$ 3. $\frac{z^2}{\sqrt[3]{(x^3+y^3)^2}}$