

The following practice problems from Chapter 6 cover topics that you must be proficient in to be successful in the next unit on exponential and logarithmic functions. Use your Ch. 6 notes.

Part I: Non-Calculator

1. Evaluate each of the following in the set of real numbers. Show the key step.

a) $9^{\frac{1}{2}}$ 3

b) $27^{\frac{2}{3}}$

c) $(-32)^{\frac{3}{5}}$ -8

d) $16^{-\frac{3}{4}}$

e) $(-8)^{-\frac{4}{3}}$ $\frac{1}{16}$

f) $(-25)^{-\frac{1}{2}}$

g) $\left(\frac{27}{1000}\right)^{\frac{2}{3}}$ $\frac{9}{100}$

h) $\left(-\frac{16}{81}\right)^{-\frac{3}{4}}$

2. Solve each equation for x.

a) $x^3 = 1000$ $x = 10$

b) $x^{\frac{1}{2}} = 7$

c) $x^{\frac{2}{3}} = 25$ $x = \pm 125$
(even root \pm)

d) $x^{-\frac{3}{4}} = 27$

3. Use a common base to simplify each expression. Write your answer in the form a^n .

a) $8^{\frac{2}{3}} \cdot 4^{\frac{1}{3}}$
 $2^{28/15}$

b) $27^{\frac{3}{4}} \cdot 81^{-\frac{5}{6}}$

c) $\frac{125^{\frac{3}{5}}}{25^{\frac{1}{4}}}$
 $5^{13/10}$

d) $\frac{16^{-\frac{2}{5}}}{32^{\frac{2}{5}}}$

4. Given the functions $f(x) = 2x^2 - x + 3$ and $g(x) = x - 4$

a) Find $p(x) = \frac{f(x)}{g(x)}$ $\frac{2x^2 - x + 3}{x - 4}$

b) Domain of $p(x)$: $\{x: x \neq 4\}$

5. Given the functions $f(x) = 5x^{\frac{2}{3}}$ and $g(x) = -2x^{\frac{1}{2}}$

a) Find $h(x) = f(x) \cdot g(x)$ $h(x) = -10x^{\frac{7}{6}}$ even root ≥ 0 Domain $h(x)$: $\{x: x \geq 0\}$

b) Find $k(x) = \frac{f(x)}{g(x)}$ Domain $k(x)$: _____

6. Given the functions $f(x) = 2x + 5$ and $g(x) = \sqrt{x - 3}$

a) Find $f(g(4))$ by evaluating inside out. $f(g(4)) = 7$

b) Find a single rule (equation) for $f(g(x))$ and state the domain of $f(g(x))$
 $f(\sqrt{x-3}) = 2(\sqrt{x-3}) + 5$ Domain $f(g(x))$: $\{x: x \geq 3\}$

c) Check your answer by using the rule to evaluate $f(g(4))$

d) Find $g(f(7))$ by evaluating inside out.

e) Find a single rule (equation) for $g(f(x))$ and state the domain of $g(f(x))$

Domain $g(f(x))$: _____

f) Check your answer by using the equation to evaluate $g(f(7))$

Note: If done correctly, a and c should match and d and f should match ☺

Part II: Calculator Approved

7. Simplify each radical expression. Answer in simplest radical form

a) $\sqrt[3]{136} = 2\sqrt[3]{17}$

b) $\sqrt[4]{162}$

c) $\sqrt{63x^4y^7} = 3x^2y^3\sqrt{7y}$

d) $\sqrt[3]{500x^{12}y^8}$

e) $\sqrt[4]{1875x^{11}y^5} = 5x^2y\sqrt[4]{3x^3y}$

f) $11\sqrt{12} + 5\sqrt{27} - 7\sqrt{75}$

g) $3\sqrt[4]{80} + 7\sqrt[4]{405} = 27\sqrt[4]{5}$

h) $3\sqrt{\frac{3}{8}} \cdot 5\sqrt{\frac{4}{5}}$

i) $(5\sqrt{2} - 7\sqrt{3})(3\sqrt{2} + \sqrt{3}) = 9 - 16\sqrt{6}$

j) $\frac{3\sqrt{5} + 7}{2\sqrt{5} - 3}$

8. Given the function $f(x) = \frac{\sqrt[3]{x+4}}{2}$

- Find the inverse of $f(x)$ and label it $f^{-1}(x)$
- Check your answer by evaluating a point in each relation.
- Check your answer by evaluating $f(f^{-1}(x))$. Watch the order in canceling!

9. Solve each radical equation. Check for extraneous solutions. Write all irrational solutions to 2 decimal places, and complex solutions in the form $a \pm bi$.

a) $\sqrt{x+7} = x+1$

~~$x = -3$~~ , $x = 2$

b) $\sqrt{8x-1} - 2 = x$

c) $\sqrt[3]{3x-5} = x-1$

$x = -1, 2$

d) $\sqrt{x+3} + \sqrt{5x+4} = 5$

10. Solve each equation. Write irrational values to 2 decimal places.

a) $x^{\frac{2}{5}} = 11$

$$x \approx \pm 401.31$$

b) $5x^{\frac{3}{10}} - 3 = 17$

c) $(x + 5)^4 - 11 = 9$

$$x \approx -2.89$$

d) $(3x - 4)^{\frac{5}{3}} + 7 = 20$