099 §7.2 #s 1, 5, 9, 10, 11, 15, 17, 19, 21, 23, 24, 29, 33, 39, 41, 45, 49, 53, 57, 61, 65, 67, 71, 73, 77, 85, 89, 93, 97

#s 1–28 Use radical notation to write each expression. Simplify, if possible

(1) $49^{\frac{1}{2}} = \sqrt{49} = \boxed{7}$

(5) $\left(\frac{1}{16}\right)^{\frac{1}{4}} = \sqrt[4]{\frac{1}{16}} = \sqrt[4]{\frac{1^4}{2^4}} = \sqrt[4]{\left(\frac{1}{2}\right)^4} = \boxed{\frac{1}{2}}$

(9) $2m^{\frac{1}{3}} = \boxed{2\sqrt[3]{m}}$

(10) $(2m)^{\frac{1}{3}} = \boxed{\sqrt[3]{2m}}$

(11) $(9x^4)^{\frac{1}{2}} = \sqrt{9x^4} = \sqrt{3^2(x^2)^2} = \sqrt{(3x^2)^2}$

$= \boxed{3x^2}$

(15) $-16^{\frac{1}{4}} = -(2^4)^{\frac{1}{4}} = -\sqrt[4]{2^4} = \boxed{-2}$

(17) $16^{\frac{3}{4}} = \sqrt[4]{16^3} = \left(\sqrt[4]{16}\right)^3 = \left(\sqrt[4]{2^4}\right)^3 = 2^3 = \boxed{8}$

(19) $(-64)^{\frac{2}{3}} = \left(\sqrt[3]{-64}\right)^2 = (-4)^2 = \boxed{16}$

(21) $(-16)^{\frac{3}{4}}$ Not real.

(23) $(2x)^{\frac{3}{5}} = \boxed{\sqrt[5]{(2x)^3}}$ OR $\sqrt[5]{8x^3}$

OR $\sqrt[5]{2^3x^3}$

099 §7.2 #s 24, 29, 33, 39, 41, 45, 49, 53, 57, 61, 65, 67, 71, 73, 77, 85, 89, 93, 97

(24) $2x^{\frac{3}{5}} = \boxed{2\sqrt[5]{x^3}}$ Compare to #23 !

(29) $8^{-\frac{4}{3}} = \dfrac{1}{8^{4/3}} = \dfrac{1}{(\sqrt[3]{8})^4} = \dfrac{1}{2^4} = \boxed{\dfrac{1}{16}}$

(33) $(-4)^{-3/2}$ $\boxed{\text{Not Real}}$

negative

even

(39) $\dfrac{5}{7x^{-3/4}} = \dfrac{5x^{3/4}}{7} = \boxed{\dfrac{5\sqrt[4]{x^3}}{7}}$

Use properties of exponents to simplify

(41) $a^{\frac{2}{3}} a^{\frac{5}{3}} = a^{\frac{2}{3}+\frac{5}{3}} = \boxed{a^{\frac{7}{3}}}$

(45) $3^{\frac{1}{4}} \cdot 3^{\frac{3}{8}} = 3^{\frac{1}{4}+\frac{3}{8}} = 3^{\frac{2}{8}+\frac{3}{8}} = \boxed{3^{\frac{5}{8}}}$

(49) $(4u^2)^{\frac{3}{2}} = \left(4^{\frac{3}{2}}\right)\left(u^2\right)^{\frac{3}{2}} = \left(2^2\right)^{\frac{3}{2}} u^{\frac{6}{2}}$

$= 2^{(2)(\frac{3}{2})} u^3 = 2^3 u^3 = \boxed{8u^3}$

(53) $\dfrac{(x^3)^{\frac{1}{2}}}{x^{\frac{7}{2}}} = \dfrac{x^{(3)(\frac{1}{2})}}{x^{\frac{7}{2}}} = \dfrac{x^{\frac{3}{2}}}{x^{\frac{7}{2}}} = x^{\frac{3}{2}-\frac{7}{2}} = x^{-\frac{4}{2}} = x^{-2}$

$= \boxed{\dfrac{1}{x^2}}$

099 § 7.2 #s 57, 61, 65, 67, 71, 73, 77, 85, 89, 93, 97

57 $\dfrac{(y^3 z)^{\frac{1}{6}}}{y^{-\frac{1}{2}} z^{\frac{1}{3}}} = \dfrac{(y^3)^{\frac{1}{6}} (z)^{\frac{1}{6}}}{y^{-\frac{1}{2}} z^{\frac{1}{3}}} = \dfrac{y^{\frac{3}{6}} z^{\frac{1}{6}}}{y^{-\frac{1}{2}} z^{\frac{1}{3}}} =$

$\dfrac{y^{\frac{1}{2}} z^{\frac{1}{6}}}{y^{-\frac{1}{2}} z^{\frac{1}{3}}} = y^{\frac{1}{2} - (-\frac{1}{2})} z^{\frac{1}{6} - \frac{1}{3}} = y^{\frac{1}{2} + \frac{1}{2}} z^{-\frac{1}{6}} = \boxed{\dfrac{y}{z^{1/6}}}$

Scratch $\frac{1}{6} - \frac{1}{3} = \frac{1}{2 \cdot 3} - \frac{1}{3} \cdot \frac{2}{2} = \frac{1}{2 \cdot 3} - \frac{2}{2 \cdot 3} = -\frac{1}{6}$

#s 61 – 66 Multiply

61 $y^{\frac{1}{2}}(y^{\frac{1}{2}} - y^{\frac{2}{3}}) = y^{\frac{1}{2}} y^{\frac{1}{2}} - y^{\frac{1}{2}} y^{\frac{2}{3}}$

$= y^{\frac{1}{2} + \frac{1}{2}} - y^{\frac{1}{2} + \frac{2}{3}} = y^1 - y^{\frac{7}{6}} = \boxed{y - y^{\frac{7}{6}}}$

Scratch $\frac{1}{2} + \frac{2}{3} = \frac{1}{2} \cdot \frac{3}{3} + \frac{2}{3} \cdot \frac{2}{2} = \frac{3}{6} + \frac{4}{6} = \frac{7}{6}$

$(a+b)(a-b) = a^2 - b^2$

65 $(2x^{\frac{1}{3}} + 3)(2x^{\frac{1}{3}} - 3) = \boxed{4x^{\frac{2}{3}} - 9}$

$= 4x^{\frac{1}{3} + \frac{1}{3}} - (2x^{\frac{1}{3}})(3) + (3)(2x^{\frac{1}{3}}) + (3)(-3)$

$= 4x^{\frac{2}{3}} - 9$ ✓

#s 67 – 72 Factor the common factor from the expression.

67 $x^{\frac{8}{3}}$; $x^{\frac{8}{3}} + x^{\frac{10}{3}} = \boxed{x^{\frac{8}{3}}(1 + x^{\frac{2}{3}})}$

$\dfrac{x^{8/3}}{x^{8/3}} = 1$, $\dfrac{x^{\frac{10}{3}}}{x^{8/3}} = x^{\frac{10}{3} - \frac{8}{3}} = x^{\frac{2}{3}}$ ✓

099 § 7.2 #s 71, 73, 77, 85, 89, 93, 97

71 $x^{-\frac{1}{3}}$ from $5x^{-\frac{1}{3}} + x^{\frac{2}{3}} = \boxed{x^{-\frac{1}{3}}(5+x)}$

Scratch:

$$\frac{5x^{-\frac{1}{3}}}{x^{-\frac{1}{3}}} = 5 \qquad \frac{x^{2/3}}{x^{-1/3}} = x^{\frac{2}{3}-(-\frac{1}{3})} = x^{1} = x$$

#s 73–84 Use rational exponents to simplify. Assume all variables are positive.

73 $\sqrt[6]{x^3} = (x^3)^{\frac{1}{6}} = x^{\frac{3}{6}} = x^{\frac{1}{2}} = \boxed{\sqrt{x}}$

77 $\sqrt[4]{16x^2} = (16x^2)^{\frac{1}{4}} = 16^{\frac{1}{4}}(x^2)^{\frac{1}{4}} = (2^4)^{\frac{1}{4}} x^{\frac{1}{2}} = 2x^{\frac{1}{2}}$

$= \boxed{2\sqrt{x}}$

#s 85–98 Use rational exponents to write as a single radical expression.

85 $\sqrt[3]{y}\,\sqrt[5]{y^2} = y^{\frac{1}{3}} y^{\frac{2}{5}} = y^{\frac{1}{3}+\frac{2}{5}}$

$= y^{\frac{5}{15}+\frac{6}{15}} = y^{\frac{11}{15}} = \boxed{\sqrt[15]{y^{11}}}$

89 $\sqrt[3]{x}\,\sqrt[4]{x}\,\sqrt[8]{x^3} = x^{\frac{1}{3}} x^{\frac{1}{4}} x^{\frac{3}{8}}$

$= x^{\frac{8}{24}+\frac{6}{24}+\frac{9}{24}} = x^{\frac{23}{24}} = \boxed{\sqrt[24]{x^{23}}}$

93 $\sqrt{3}\,\sqrt[3]{4} = 3^{\frac{1}{2}} \cdot 4^{\frac{1}{3}} = 3^{\frac{3}{6}} \cdot 4^{\frac{2}{6}} = (3^3 \cdot 4^2)^{\frac{1}{6}}$

$= \sqrt[6]{3^3 \cdot 4^2} = \boxed{\sqrt[6]{432}}$