Please let me know of any mistakes

Problem 1

i) $-9^{1/2} = -(9)^{1/2} = -3$ ii) $27^{1/3} = 3$ iii) $(-64)^{1/3} = -4$ iv) $(-27)^{4/3} = 81$

v) $125^{-2/3} = (5)^{-2} = \frac{1}{25}$ vi) $8^{-4/3} = \frac{1}{16}$ vii) $\left(\frac{1}{4}\right)^{1/2} = \frac{1}{2}$ viii) $\left(\frac{4}{9}\right)^{3/2} = \frac{8}{27}$

ix) $\left(-\frac{8}{27}\right)^{2/3} = \frac{4}{9}$ x) $7\sqrt{288} = 7\sqrt{4\times36\times2} = 7\cdot2\cdot6\sqrt{2} = 84\sqrt{2}$

Problem 2.

i) $\frac{\sqrt{28}}{6} = \frac{\sqrt{9\cdot3}}{6} = \frac{3\sqrt{3}}{6} = \frac{1}{2}\sqrt{3}$ ii) $\sqrt[4]{\frac{16}{81}} = \sqrt[4]{\frac{2^4}{3^4}} = \frac{2}{3}$ iii) $\sqrt{48} = \sqrt{16\times3} = 4\sqrt{3}$ iv) $3\sqrt{121} = 3\cdot11 = 33$

v) $y^{2/3}\cdot y^{7/3} = y^{9/3} = y^3$ vi) $(a^{1/2}b^{1/3})^2 = a\,b^{2/3}$ vii) $(2a^{1/2})(3a) = 6a^{3/2}$ viii) $10^{2/3} : 10^{2/3}$

ix) $-2^{1/4} = -2^{1/4}$ x) $\sqrt[3]{\frac{-8a^3}{b^{15}}} = \frac{-2a}{b^5}$

Problem 3

i) $\sqrt{28} = \sqrt{9\cdot3} = 3\sqrt{3}$ ii) $\frac{1}{\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$ iii) $\frac{7}{\sqrt{7}}\cdot\frac{\sqrt{7}}{\sqrt{7}} = \frac{7\sqrt{7}}{7} = \sqrt{7}$ iv) $\sqrt{\frac{x}{8}} = \frac{\sqrt{x}}{\sqrt{8}}\frac{\sqrt{8}}{\sqrt{8}} = \frac{2\sqrt{2x}}{8} = \frac{1}{4}\sqrt{2x}$

v) $\sqrt[3]{40} = \sqrt[3]{8\cdot5} = 2\sqrt[3]{5}$ vi) $\sqrt[3]{54} = \sqrt[3]{27\cdot2} = 3\sqrt[3]{2}$ vii) $\sqrt[3]{-250x^3} = \sqrt[3]{5^3\cdot2\cdot x^3} = 5x\sqrt{2}$

viii) $\sqrt[3]{-24z^5} = \sqrt[3]{-8\cdot3\cdot z^5} = -2z^{5/3}\sqrt[3]{3}$ ix) $\frac{\sqrt{3}-\sqrt{5}}{\sqrt{3}+\sqrt{5}}\cdot\frac{(\sqrt{3}-\sqrt{5})}{(\sqrt{3}-\sqrt{5})} = \frac{3-2\sqrt{15}+5}{3+5} = \frac{8-2\sqrt{15}}{8}$

x) $\sqrt{18a}\div\sqrt{2a^4} = \frac{\sqrt{9\cdot2\cdot a}}{\sqrt{2a^4}} = \frac{3\sqrt{2}a^{1/2}}{\sqrt{2}\,a^2} = \frac{3}{a^{3/2}}$ xi) $\frac{2\sqrt{5}-\sqrt{15}}{\sqrt{15}-3\sqrt{3}}\cdot\frac{\sqrt{15}+3\sqrt{3}}{\sqrt{15}+3\sqrt{3}} = \frac{2\sqrt{75}+6\sqrt{15}-15-3\sqrt{45}}{15-9(3)}$

$= \frac{2\cdot5\sqrt{3}+6\sqrt{15}-15-3\cdot3\sqrt{5}}{15-27}$

$= \frac{10\sqrt{3}+6\sqrt{15}-9\sqrt{5}-15}{-12}$

xii) $\frac{\sqrt{5}-\sqrt{7}}{\sqrt{7}+\sqrt{5}}\cdot\frac{\sqrt{5}-\sqrt{7}}{\sqrt{5}-\sqrt{7}} = \frac{5-2\sqrt{35}+7}{5-7} = \frac{12-2\sqrt{35}}{-2} = -6+\sqrt{35}$

xiii) $\frac{23}{\sqrt{2}+1}\cdot\frac{\sqrt{2}-1}{\sqrt{2}-1} = \frac{23\sqrt{2}-23}{2-1} = 23\sqrt{2}-23$ xiv) $\frac{7}{2\sqrt{2}+1}\cdot\frac{2\sqrt{2}-1}{2\sqrt{2}-1} = \frac{14\sqrt{2}-7}{4(2)-1} = \frac{14\sqrt{2}-7}{7} = 2\sqrt{2}-1$

xv) $-2\sqrt[3]{-48v^7} = -2(-2)\sqrt[3]{6}\,v^{7/3}$ xvi) $8\sqrt[7]{384b^8} = 8\sqrt[7]{2^7\cdot3\cdot6^7\cdot b} = 16b\sqrt[7]{3b}$

Problem 4

i) $\sqrt{8}+\sqrt{20}-\sqrt{12} = 2\sqrt{2}+2\sqrt{5}+2\sqrt{3}$ ii) $\sqrt{18}-\sqrt{50}+\sqrt{12}-\sqrt{75} = 3\sqrt{2}-5\sqrt{2}+2\sqrt{3}-5\sqrt{3} = -2\sqrt{2}-3\sqrt{3}$

iii) $2\sqrt{3}(3-\sqrt{3}) = 2\sqrt{3}\cdot\sqrt{3}(\sqrt{3}-1) = 6(\sqrt{3}-1)$ iv) $3(2\sqrt{12}-\sqrt{90}) = 3(2\cdot2\sqrt{3}-3\sqrt{10}) = 3(4\sqrt{3}-3\sqrt{10})$

$= 3\sqrt{3}(4-\sqrt{30})$

v) $(\sqrt{x}-\sqrt{y})(\sqrt{x}+\sqrt{y}) = x-y$ vi) $\sqrt{15ab}(\sqrt{5a}-\sqrt{3b}) = \sqrt{75b}\,a-\sqrt{45a}\,b = 5\sqrt{3}\,a\sqrt{b}-3\sqrt{5a}\,b = 5a\sqrt{3b}-3b\sqrt{5a}$

vii) $2\sqrt[3]{40a^4b^8} = 2\cdot2\cdot a\cdot b^2\sqrt[3]{5ab^2} = 4ab^2\sqrt[3]{5ab^2}$ viii) $\sqrt[5]{x^{25}y^{17}z^3} = x^5y^3\sqrt[5]{y^2z^3}$ ix) $-6\sqrt[4]{32x^7yz^7} = -6\cdot4xz\sqrt{2x^3yz^3} = -24xz\sqrt{2x^3yz^3}$

x) $3\sqrt[3]{135xy^3} = 3\cdot3\cdot y\sqrt[3]{5x} = 9y\sqrt[3]{5x}$