1.- Racionaliza:

a) $\frac{-3}{2\sqrt{2}}=\frac{-3\cdot\sqrt{2}}{2\sqrt{2}\sqrt{2}}=-\frac{3\sqrt{2}}{4}$ b) $\frac{3}{2\sqrt{3}}=\frac{3\sqrt{3}}{2\sqrt{3}\sqrt{3}}=\frac{3\sqrt{3}}{2\cdot 3}=\frac{\sqrt{3}}{2}$

c) $\frac{1}{\sqrt[3]{32}}=\frac{1}{\sqrt[3]{2^5}}=\frac{\sqrt[3]{2}}{\sqrt[3]{2^5}\cdot\sqrt[3]{2}}=\frac{\sqrt[3]{2}}{\sqrt[3]{2^6}}=\frac{\sqrt[3]{2}}{2^2}=\frac{\sqrt[3]{2}}{4}$

d) $\frac{1}{\sqrt[5]{128}}=\frac{1}{\sqrt[5]{2^7}}=\frac{1}{2\sqrt[5]{2^2}}=\frac{\sqrt[5]{2^3}}{2\sqrt[5]{2^2}\sqrt[5]{2^3}}=\frac{\sqrt[5]{2^3}}{2\sqrt[5]{2^5}}=\frac{\sqrt[5]{2^3}}{4}$

e) $\frac{1+\sqrt{2}}{2\sqrt{2}}=\frac{\left(1+\sqrt{2}\right)\sqrt{2}}{2\sqrt{2}\sqrt{2}}=\frac{\sqrt{2}+2}{4}$

f) $\frac{\sqrt{3}-3}{2\sqrt{3}}=\frac{\left(\sqrt{3}-3\right)\sqrt{3}}{2\sqrt{3}\sqrt{3}}=\frac{3-3\sqrt{3}}{6}=\frac{1-\sqrt{3}}{2}$

g) $\frac{1-\sqrt{5}}{\sqrt{5}}=\frac{\left(1-\sqrt{5}\right)\sqrt{5}}{\sqrt{5}\sqrt{5}}=\frac{\sqrt{5}-5}{5}$

h) $\frac{3}{1+\sqrt{2}}=\frac{3\left(1-\sqrt{2}\right)}{\left(1+\sqrt{2}\right)\left(1-\sqrt{2}\right)}=\frac{3-3\sqrt{2}}{1-2}=\frac{3-3\sqrt{2}}{-1}=3\sqrt{2}-3$

i) $\frac{3-\sqrt{2}}{3+\sqrt{2}}=\frac{\left(3-\sqrt{2}\right)\left(3-\sqrt{2}\right)}{\left(3+\sqrt{2}\right)\left(3-\sqrt{2}\right)}=\frac{9-6\sqrt{2}+2}{9-2}=\frac{11-6\sqrt{2}}{7}$

j) $\frac{2}{2\sqrt{2}+1}=\frac{2\left(2\sqrt{2}-1\right)}{\left(2\sqrt{2}+1\right)\left(2\sqrt{2}-1\right)}=\frac{4\sqrt{2}-2}{8-1}=\frac{4\sqrt{2}-2}{7}$

k) $\frac{1-\sqrt{2}}{2+3\sqrt{2}}=\frac{\left(1-\sqrt{2}\right)\left(2-3\sqrt{2}\right)}{\left(2+3\sqrt{2}\right)\left(2-3\sqrt{2}\right)}=\frac{2-5\sqrt{2}+6}{4-18}=\frac{8-5\sqrt{2}}{-14}=\frac{5\sqrt{2}-8}{14}$

l) $\frac{\sqrt{5}}{\sqrt{2}+\sqrt{5}}=\frac{\sqrt{5}\left(\sqrt{2}-\sqrt{5}\right)}{\left(\sqrt{2}+\sqrt{5}\right)\left(\sqrt{2}-\sqrt{5}\right)}=\frac{\sqrt{10}-5}{2-5}=\frac{5-\sqrt{10}}{3}$

2.- Efectúa las siguientes operaciones:

a) $\frac{1}{\sqrt{2}}+\frac{3}{\sqrt{3}}-\frac{5}{2\sqrt{2}}=\frac{\sqrt{2}}{2}+\sqrt{3}-\frac{5\sqrt{2}}{4}=\frac{2\sqrt{2}+4\sqrt{3}-5\sqrt{2}}{4}=\frac{4\sqrt{3}-3\sqrt{2}}{4}$

$$\frac{1}{\sqrt{2}}=\frac{\sqrt{2}}{\sqrt{2}\sqrt{2}}=\frac{\sqrt{2}}{2}$$
$$\frac{3}{\sqrt{3}}=\frac{3\sqrt{3}}{\sqrt{3}\sqrt{3}}=\frac{3\sqrt{3}}{3}=\sqrt{3}$$
$$\frac{5}{2\sqrt{2}}=\frac{5\sqrt{2}}{2\sqrt{2}\sqrt{2}}=\frac{5\sqrt{2}}{4}$$

b) $$\frac{3}{\sqrt{2}}-\frac{1}{3\sqrt{3}}+\frac{1}{\sqrt{5}}=\frac{3\sqrt{2}}{2}-\frac{\sqrt{3}}{9}+\frac{\sqrt{5}}{5}=\frac{135\sqrt{2}-10\sqrt{3}+18\sqrt{5}}{90}$$
$$\frac{3}{\sqrt{2}}=\frac{3\sqrt{2}}{\sqrt{2}\sqrt{2}}=\frac{3\sqrt{2}}{2}$$
$$\frac{1}{3\sqrt{3}}=\frac{\sqrt{3}}{3\sqrt{3}\sqrt{3}}=\frac{\sqrt{3}}{9}$$
$$\frac{1}{\sqrt{5}}=\frac{\sqrt{5}}{\sqrt{5}\sqrt{5}}=\frac{\sqrt{5}}{5}$$

c) $$\frac{1}{\sqrt{2}-\sqrt{3}}+\frac{2}{\sqrt{3}-1}=-\sqrt{2}-\sqrt{3}+\sqrt{3}+1=1-\sqrt{2}$$
$$\frac{1}{\sqrt{2}-\sqrt{3}}=\frac{\sqrt{2}+\sqrt{3}}{\left(\sqrt{2}-\sqrt{3}\right)\left(\sqrt{2}+\sqrt{3}\right)}=\frac{\sqrt{2}+\sqrt{3}}{2-3}=-\sqrt{2}-\sqrt{3}$$
$$\frac{2}{\sqrt{3}-1}=\frac{2\left(\sqrt{3}+1\right)}{\left(\sqrt{3}-1\right)\left(\sqrt{3}+1\right)}=\frac{2\left(\sqrt{3}+1\right)}{3-1}=\sqrt{3}+1$$

d) $$\frac{3}{1-\sqrt{2}}+\frac{1}{\sqrt{2}-\sqrt{3}}=-3-3\sqrt{2}-\sqrt{2}-\sqrt{3}=-3-4\sqrt{2}-\sqrt{3}$$
$$\frac{3}{1-\sqrt{2}}=\frac{3\left(1+\sqrt{2}\right)}{\left(1-\sqrt{2}\right)\left(1+\sqrt{2}\right)}=\frac{3\left(1+\sqrt{2}\right)}{1-2}=-3-3\sqrt{2}$$
$$\frac{1}{\sqrt{2}-\sqrt{3}}=\frac{\sqrt{2}+\sqrt{3}}{\left(\sqrt{2}-\sqrt{3}\right)\left(\sqrt{2}+\sqrt{3}\right)}=\frac{\sqrt{2}+\sqrt{3}}{-1}=-\sqrt{2}-\sqrt{3}$$

e) $$\frac{4}{2-\sqrt{3}}-\frac{1}{\sqrt{3}}+\frac{2}{\sqrt{3}-3\sqrt{2}}=8+4\sqrt{3}-\frac{\sqrt{3}}{3}-\frac{2\sqrt{3}+6\sqrt{2}}{15}=\frac{55+58\sqrt{3}+6\sqrt{2}}{15}$$
$$\frac{4}{2-\sqrt{3}}=\frac{4\left(2+\sqrt{3}\right)}{\left(2-\sqrt{3}\right)\left(2+\sqrt{3}\right)}=\frac{4\left(2+\sqrt{3}\right)}{4-3}=8-4\sqrt{3}$$
$$\frac{1}{\sqrt{3}}=\frac{\sqrt{3}}{3}$$
$$\frac{2}{\sqrt{3}-3\sqrt{2}}=\frac{2\left(\sqrt{3}+3\sqrt{2}\right)}{\left(\sqrt{3}-3\sqrt{2}\right)\left(\sqrt{3}+3\sqrt{2}\right)}=\frac{2\left(\sqrt{3}+3\sqrt{2}\right)}{3-18}=\frac{2\sqrt{3}+6\sqrt{2}}{-15}$$