

Skills 5 - Key

$$\#1. a) \frac{1}{c^2} + \frac{b}{a^2} = \frac{1}{c^2} \left(\frac{a^2}{a^2} \right) + \frac{b}{a^2} \left(\frac{c^2}{c^2} \right) = \frac{a^2}{c^2 a^2} + \frac{bc^2}{a^2 c^2} = \boxed{\frac{a^2 + bc^2}{a^2 c^2}}$$

$$b) \frac{1}{(x+\Delta x)} - \frac{1}{x} = \frac{1}{(x+\Delta x)} \left(\frac{x}{x} \right) - \frac{1}{x} \left(\frac{x+\Delta x}{x+\Delta x} \right) = \frac{x}{x(x+\Delta x)} - \frac{x+\Delta x}{x(x+\Delta x)} = \frac{x - x - \Delta x}{x(x+\Delta x)} = \boxed{\frac{-\Delta x}{x(x+\Delta x)}}$$

$$c) \frac{z}{z^2+9} + \frac{z+1}{z^2+10} = \frac{z}{z^2+9} \left(\frac{z^2+10}{z^2+10} \right) + \frac{z+1}{z^2+10} \left(\frac{z^2+9}{z^2+9} \right) = \frac{z^3+10z}{(z^2+9)(z^2+10)} + \frac{z^3+9z+z^2+9}{(z^2+9)(z^2+10)} =$$

$$\boxed{\frac{2z^3 + z^2 + 19z + 9}{(z^2+9)(z^2+10)}}$$

$$d) \frac{1}{\sqrt{x+h}} - \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{x+h}} \left(\frac{\sqrt{x}}{\sqrt{x}} \right) - \frac{1}{\sqrt{x}} \left(\frac{\sqrt{x+h}}{\sqrt{x+h}} \right) = \boxed{\frac{\sqrt{x} - \sqrt{x+h}}{(\sqrt{x})(\sqrt{x+h})}}$$

$$\#2. a) \boxed{z^2 + 2z\Delta z + \Delta z^2}$$

$$b) \boxed{z^3 + 3z^2\Delta z + 3z\Delta z^2 + \Delta z^3}$$

$$c) \boxed{z^4 + 4z^3\Delta z + 6z^2\Delta z^2 + 4z\Delta z^3 + \Delta z^4}$$

$$d) \boxed{z^5 + 5z^4\Delta z + 10z^3\Delta z^2 + 10z^2\Delta z^3 + 5z\Delta z^4 + \Delta z^5}$$

$$\#3. a) \frac{1}{x^8} = \boxed{x^{-8}}$$

$$b) \sqrt{x} = \boxed{x^{1/2}}$$

$$c) \frac{4}{x^2} = \boxed{4x^{-2}}$$

$$d) 20\sqrt[3]{x+13} = \boxed{20(x+13)^{1/3}}$$

$$e) \frac{1}{\sqrt[5]{x}} = \boxed{x^{-1/5}}$$

$$f) \frac{\sqrt{x+1}}{\sqrt{x-1}} = \boxed{(x+1)^{1/2} \cdot (x-1)^{-1/2}}$$

$$\#4. a) x^{-15} = \boxed{\frac{1}{x^{15}}}$$

$$b) x^{1/3} = \boxed{\sqrt[3]{x}}$$

$$c) (7x+4)^{-6} = \boxed{\frac{1}{(7x+4)^6}}$$

$$d) (7x+4)^{-1} = \boxed{\frac{1}{(7x+4)}}$$

$$e) (6x^7 - 11x^3)^{1/3} = \boxed{\sqrt[3]{6x^7 - 11x^3}}$$

$$f) (z+18)^{10} (z+10)^{-4} = \boxed{\frac{(z+18)^{10}}{(z+10)^4}}$$

$$g) (x+1)^{1/5} (x-1)^{-1/4} = \boxed{\frac{\sqrt[5]{x+1}}{\sqrt[4]{x-1}}}$$