

$$((a^r + b^r + rab)(a^r + b^r + rab))^r = (a^r + b^r + rab - rab)^r = (a^r + b^r - rab)^r$$

$$\Rightarrow (\sqrt{9} - 2 + \sqrt{9} + 2 - 2(\sqrt{9} + 2)(\sqrt{9} - 2))^r = (2\sqrt{9} - 2\sqrt{9})^r = 22 - 14\sqrt{9} = t(2 - \sqrt{9})$$

$$14(\sqrt{9} - 2) = t(2 - \sqrt{9})$$

$$\Rightarrow t = 14 \quad \checkmark$$

$$\left(a + \frac{1}{a} + \sqrt{r}\right)\left(a + \frac{1}{a} - \sqrt{r}\right)^r = \left(a^r + \frac{1}{a^r} + \sqrt{r}\right)^r = a^r + \frac{1}{a^r} + r$$

$$= 2 - 4\sqrt{r} + \frac{1}{2 - 4\sqrt{r}} + r \rightarrow \frac{1}{2 - 4\sqrt{r}} \times \frac{(2 + 4\sqrt{r})}{(2 + 4\sqrt{r})} = \frac{2 + 4\sqrt{r}}{4 - 16} = \frac{2 + 4\sqrt{r}}{-12}$$

$$\Rightarrow 2 - 4\sqrt{r} + \frac{2 + 4\sqrt{r}}{-12} + r = 7^t$$

$$14 = 7^t \Rightarrow t = 2 \quad \checkmark$$

$$A = \sqrt[r]{r^r \sqrt[r]{r^r}} \times r^{\frac{r}{r}} = \sqrt[r]{r^{r^2}} \times r^{\frac{r}{r}} = r^{\frac{r^2}{r}} \times r^{\frac{r}{r}} = r^r$$

$$(rA)^{\frac{1}{r}} = (r \times r)^{\frac{1}{r}} = \frac{1}{r} \quad \checkmark$$

$$\sqrt[r]{a} = r^r \times a^{\frac{1}{r}} \Rightarrow a = r^r \times a^{\frac{1}{r}} \Rightarrow a^{\frac{r-1}{r}} = r^r \Rightarrow a = \frac{1}{r^{\frac{r-1}{r}}}$$

$$\frac{\left(\frac{1}{a} - r\right)}{1 + \sqrt{r}} = \frac{r\sqrt{r} - r}{\sqrt{r} + 1} \times \frac{(\sqrt{r} - 1)}{(\sqrt{r} - 1)} = \frac{r(\sqrt{r} - 1)^2}{r} = \frac{r(r - 2\sqrt{r} + 1)}{r} = r - 2\sqrt{r} + 1$$

$$= 9 - 2\sqrt{9} + 1 = 4 \quad \checkmark$$

$$(\sqrt{x+a} - \sqrt{x-r})(\sqrt{x+a} + \sqrt{x-r}) = r(\sqrt{x+a} + \sqrt{x-r}) \Rightarrow x+a - x+r = r(\sqrt{x+a} + \sqrt{x-r})$$

$$\Rightarrow \frac{a}{r} + r = (\sqrt{x+a} + \sqrt{x-r})$$

$$\Rightarrow \sqrt{x+a} + \sqrt{x-r} - r = \frac{a}{r} + r - r = \frac{a}{r} \quad \checkmark$$