# Answer on Question #46174 – Math – Complex Analysis

Find the square root of $4ab - 2i(a^2 - b^2)$.

$$\sqrt{4ab - 2i(a^2 - b^2)}$$

**Solution**

1) if a>0, b>0 or a<0, b<0

$$\sqrt{\boldsymbol{4ab - 2i(a^2 - b^2)}} = \sqrt{2(a^2 + b^2)}\,(\cos({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right)) + i\sin({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right)))\ ;$$

$$\sqrt{\boldsymbol{4ab - 2i(a^2 - b^2)}} = \sqrt{2(a^2 + b^2)}(\cos({}^1/_2 \operatorname{arctg}\left(\frac{b^2 - a^2}{2ab}\right) + \pi) + i\sin({}^1/_2 \operatorname{arctg}\left(\frac{b^2 - a^2}{2ab}\right) + \pi)).$$

2) if (a<0, b>0 or a>0, b<0) with $b^2 > a^2$

$$\sqrt{\boldsymbol{4ab - 2i(a^2 - b^2)}} = \sqrt{2(a^2 + b^2)}(\cos({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) + {}^\pi/_2) + i\sin({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) + {}^\pi/_2));$$

$$\sqrt{\boldsymbol{4ab - 2i(a^2 - b^2)}} = \sqrt{2(a^2 + b^2)}(\cos({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) + \tfrac{3\pi}{2}) + i\sin({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) + \tfrac{3\pi}{2})).$$

3) if (a<0, b>0 or a>0, b<0) with $a^2 > b^2$

$$\sqrt{\boldsymbol{4ab - 2i(a^2 - b^2)}} = \sqrt{2(a^2 + b^2)}(\cos({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) - {}^\pi/_2) + i\sin({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) - {}^\pi/_2));$$

$$\sqrt{\boldsymbol{4ab - 2i(a^2 - b^2)}} = \sqrt{2(a^2 + b^2)}(\cos({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) + \tfrac{\pi}{2}) + i\sin({}^1/_2 \operatorname{arctg}\left(\tfrac{b^2 - a^2}{2ab}\right) + \tfrac{\pi}{2})).$$