

Q7: Using the addition formula from Q6, we get that

$$0 = \wp(u)(\wp'(v) + \wp'(u + v)) - \wp'(u)(\wp(v) - \wp(u + v)) - \wp(v)\wp'(u + v) - \wp'(v)\wp(u + v).$$

Now, substituting the relationship

$$\wp'(u + v) = -\frac{\wp'(v) - \wp'(u)}{\wp(v) - \wp(u)}\wp(u + v) - \frac{\wp'(u)\wp(v) - \wp'(v)\wp(u)}{\wp(v) - \wp(u)},$$

Which must hold when the addition formula holds, we get that

$$4\wp(u + v)(\wp(u) - \wp(v))^2 = -(\wp(u) + \wp(v))(\wp(u) - \wp(v))^2 + (\wp'(u) - \wp'(v))^2$$

And rearranging this gives us

$$\wp(u + v) = -\wp(u) - \wp(v) + \frac{1}{4}\left(\frac{\wp'(u) - \wp'(v)}{\wp(u) - \wp(v)}\right)^2$$

As desired.