**1E Part 2 Infinite Summations**

1. $S=1+\frac{1}{2}e^{iθ}+\frac{1}{4}e^{2iθ}+\frac{1}{8}e^{3iθ}+…$
2. Show that

$$S=\frac{4-2\cos(θ)+2i\sin(θ)}{5-4\cos(θ)}$$

Let: $P=1+\frac{1}{2}cosθ+\frac{1}{4}cos2θ+\frac{1}{8}cos3θ+… and Q=\frac{1}{2}sinθ+\frac{1}{4}sin2θ+\frac{1}{8}sin3θ+…$

1. Show that $S=P+Qi$
2. Hence, find trigonometric expressions for $P$ and $Q$