1) $\ldots = \frac{cos\alpha}{sin\alpha} + \frac{sin\alpha}{1+cos\alpha} = \frac{cos\alpha + cos^2\alpha + sin^2\alpha}{sin\alpha(1+cos\alpha)} = \frac{cos\alpha + 1}{sin\alpha(cos\alpha + 1)} = \frac{1}{cos\alpha}$

2) $\ldots = \frac{sin\alpha - sin\alpha cos\alpha - sin\alpha - sin\alpha cos\alpha}{1 - cos^2\alpha} = \frac{-2sin\alpha cos\alpha}{sin^2\alpha} = -\frac{2cos\alpha}{sin\alpha} = -2ctg\alpha$

3) $\ldots = \frac{cos^2\alpha + 2sin^2\alpha}{cos^3\alpha} + \frac{1 + 4sin\alpha}{cos\alpha(1 + 4sin\alpha)} = \frac{cos^2\alpha + 2sin^2\alpha + cos^2\alpha}{cos^3\alpha}$

$= \frac{2(cos^2\alpha + sin^2\alpha)}{cos^3\alpha} = \frac{2}{cos^3\alpha}$