4a) $$\int_0^\theta \sec\phi\, d\phi = \int_0^\theta \sec\phi \, \frac{\sec(\phi)+\tan(\phi)}{\sec(\phi)+\tan(\phi)}\, d\phi$$

$$= \int_0^\theta \frac{\sec^2\phi + \sec\phi\tan\phi}{\sec\phi+\tan\phi}\, d\phi \quad **$$

$u = \sec\phi + \tan\phi$

$\frac{du}{d\phi} = \sec^2\phi + \sec\phi\tan\phi$

~~$\int_a^b \frac{du}{u}$~~

$$\int_a^b \frac{du}{u} = \ln(u)\Big|_a^b = \ln|\sec(\phi)+\tan(\phi)|\Big|_0^\theta$$

$$\therefore \int_0^\theta \sec\phi\, d\phi = \ln|\sec(\theta)+\tan(\theta)|$$