8|c(i)

$$\int_0^{2\pi}\frac{\sin^2 t}{2-\cos t}\,dt = \left\{\begin{array}{l} z = e^{it} \\ dz = iz\,dt \\ \sin t = \dfrac{e^{it}-e^{-it}}{2i} = \dfrac{1}{2i}\left(z-\dfrac{1}{z}\right) \\ \cos t = \dfrac{e^{it}+e^{-it}}{2} = \dfrac{1}{2}\left(z+\dfrac{1}{z}\right) \end{array} \quad \begin{array}{l} \gamma(t) = e^{it}, \\ t\in[0,2\pi] \end{array}\right\} =$$

$$= \int_\gamma \frac{\left(\frac{1}{2i}\left(z-\frac{1}{z}\right)\right)^2}{2-\frac{1}{2}\left(z+\frac{1}{z}\right)}\,\frac{dz}{iz} = \frac{1}{i}\int_\gamma \frac{-\frac{1}{4}\left(z^2-2+\frac{1}{z^2}\right)dz}{2z-\frac{1}{2}z^2 \cancel{+} - \frac{1}{2}} =$$

$$= -\frac{1}{4i}\int_\gamma \overset{f(z)}{\boxed{\frac{z^4-2z^2+1}{z^2\left(-\frac{1}{2}z^2+2z \cancel{+} - \frac{1}{2}\right)}}}\,dz = -\frac{1}{4i}\,2\pi i\left(\mathrm{res}(f,0)+\mathrm{res}(f,z_2)\right)$$

$$-\frac{1}{2}z^2+2z \cancel{+} - \frac{1}{2} = 0$$

$$\Delta = 4 \cancel{+} - 1 = \cancel{5}\ 3$$

$$z_{1,2} = \frac{-2\pm\sqrt{\cancel{5}\,3}}{-1} \qquad z_1 = 2+\sqrt{\cancel{5}\,3} \qquad z_2 = 2-\sqrt{\cancel{5}\,3}$$