UVA Math Club Integration Bee

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1. $\displaystyle\int e^{\arccos(x)}\, dx = -\frac{(\sqrt{1-x^2}-x)e^{arccos(x)}}{2}$

2. $\displaystyle\int \sqrt{x+\sqrt{x+\sqrt{x+\cdots}}}\, dx = \frac{(4x+1)^{\frac{3}{2}}}{12} + \frac{x}{2}$

3. $\displaystyle\int_0^\infty \frac{1}{(x+\frac{1}{x})^2}\, dx = \frac{\pi}{4}$

4. $\displaystyle\int \frac{\sin 2x}{1+2\sin^2 x}\, dx = \frac{\ln|\sec(2x)|}{2}$

5. $\displaystyle\int \frac{x}{2+e^x+e^{-x}}\, dx = \frac{xe^x}{e^x+1} - \ln(e^x+1)$

6. $\displaystyle\int \frac{1+\sin x}{1+\cos x}\, dx = \tan\left(\frac{x}{2}\right) - \ln(\cos(x)+1)$

7. $\displaystyle\int \frac{\sin^3 x}{\sqrt{\cos x}}\, dx = \frac{2\sqrt{\cos x}(\cos^2 x - 5)}{5}$