| Integrand | $I_1 = \int_0^{\sqrt[3]{\pi}} 2x^2 \cos\left(\frac{x^3}{2}\right) \mathrm{d}x$ | $I_2 = \int_1^3 \frac{x}{\sqrt{18-2x^2}} \mathrm{d}x$ | $I_3 = \int_{\frac{\pi}{3}}^{\frac{\pi}{2}} 3\cos^3(x)\sin(x)\ \mathrm{d}x$ | $I_4 = \int_{\ln(3)}^{\ln(10)} \frac{\mathrm{e}^x}{1+\mathrm{e}^x} \mathrm{d}x$ | $I_5 = \int_0^{81} \sqrt{25-\sqrt{x}}\ \mathrm{d}x$ |
|---|---|---|---|---|---|
| Substitution to use | | Let $u = 18 - 2x^2$ | | | Let $u = 25 - \sqrt{x}$ |
| Expression for $\mathrm{d}x$ and | | | | | |
| Transformation of the integral limits | | | $x = \frac{\pi}{3}$ so $u = \frac{1}{2}$<br>$x = \frac{\pi}{2}$ so $u = 0$ | | |
| Evaluate the integral | | | | | |
| Answer | $I_1 = \sqrt{3}$ | | | $I_4 = \ln\left(\frac{11}{4}\right)$ | $I_5 = \frac{5288}{15}$ |

**Challenge**

Using the same steps as in the grid above show that $I = \int_0^{\frac{\pi}{4}} \tan\left(\sqrt{x}\right) \sec^2\left(\sqrt{x}\right)\ \mathrm{d}x \approx 0.9913$

*Hint: You will likely need to do two integrals by substitution.*