Quiz 11

Compute

$$\int_0^4 2\sqrt{2x+1}\,dx.$$

Solution. Let $u = 2x + 1$. Then $du = 2dx$ and

$$\begin{aligned}\int 2\sqrt{2x+1}\,dx &= \int \sqrt{2x+1}\cdot 2dx \\ = \int \sqrt{u}\,du &= \frac{2}{3}u^{\frac{3}{2}} + C \\ &= \frac{2}{3}(2x+1)^{\frac{3}{2}} + C.\end{aligned}$$

Therefore,

$$\begin{aligned}\int_0^4 2\sqrt{2x+1}\,dx &= \frac{2}{3}(2x+1)^{\frac{3}{2}}\,|_0^4 \\ = \frac{2}{3}(2\cdot 4+1)^{\frac{3}{2}} - \frac{2}{3}(1)^{\frac{3}{2}} &= \frac{2}{3}(3^3-1^3) = \frac{52}{3}.\end{aligned}$$