MATH 20C: FUNDAMENTALS OF CALCULUS II
QUIZ #2

Problem 1. Evaluate the integral

$$\int 6x\sqrt{2x^2+1}\,dx.$$

Solution. We make the substitution $u = 2x^2 + 1$ (since it is under the square root). We obtain $du = 4x\,dx$, so $x\,dx = du/4$. Thus

$$\begin{aligned}\int 6x\sqrt{2x+1}\,dx &= 6\int \sqrt{2x+1}(x\,dx) = 6\int \sqrt{u}\,\frac{du}{4}\\ &= \frac{3}{2}\int u^{1/2}\,du = \frac{3}{2}\frac{u^{3/2}}{3/2} + C = u^{3/2} + C = (2x^2+1)^{3/2} + C.\end{aligned}$$

Problem 2. Evaluate the integral

$$\int \frac{5e^{1/x}}{x^2}\,dx.$$

Solution. We make the substitution $u = 1/x$ (since this is in the exponent). We obtain $du = -1/x^2\,dx$ so $\dfrac{dx}{x^2} = -du$, hence

$$\int \frac{5e^{1/x}}{x^2}\,dx = 5\int e^u(-du) = -5e^u + C = -5e^{1/x} + C.$$

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