

# quiz solutions

please integrate.

u-sub

$$1. \int (x+1)\sqrt{2x+x^2} dx = \frac{1}{2} \int u^{1/2} du = \frac{1}{2} \cdot \frac{2}{3} u^{3/2}$$
$$u = 2x+x^2$$
$$du = 2+2x dx$$
$$\frac{1}{2} du = (x+1) dx$$
$$= \boxed{\frac{1}{3} (2x+x^2)^{3/2} + C}$$

parts

$$2. \int w \ln w dw = \frac{1}{2} w^2 \ln w - \frac{1}{2} \int w dw$$
$$u = \ln w \quad v = \frac{1}{2} w^2$$
$$dv = w dw \quad du = \frac{1}{w} dw$$
$$= \boxed{\frac{1}{2} w^2 \ln w - \frac{1}{4} w^2 + C}$$

u-sub

$$3. \int \frac{d\theta}{\cos^2 \theta \sqrt{1+\tan \theta}} = \int u^{-1/2} du = 2u^{1/2} = \boxed{2(1+\tan \theta)^{1/2} + C}$$
$$u = 1 + \tan \theta$$
$$du = \sec^2 \theta d\theta = \frac{d\theta}{\cos^2 \theta}$$

u-sub

$$4. \int \frac{y}{1+y^4} dy = \frac{1}{2} \int \frac{du}{1+u^2} = \frac{1}{2} \arctan(u)$$
$$u = y^2$$
$$du = 2y dy \quad \frac{1}{2} du = y dy$$
$$= \boxed{\frac{1}{2} \arctan(y^2) + C}$$

parts

$$5. \int x \cos x dx = x \sin x - \int \sin x dx = \boxed{x \sin x + \cos x + C}$$
$$u = x \quad v = \sin x$$
$$dv = \cos x dx \quad du = dx$$