

2 \boxtimes Differentiate

$$1. \int x \sin 2x \, dx \text{ (by parts)} \\ = \frac{-x}{2} \cos 2x + \frac{1}{4} \sin 2x + C$$

$$2. \int x e^{x^2} \, dx \text{ (by substitution)} \\ = \frac{1}{2} e^{x^2} + C$$

$$3. \int x e^x \, dx \text{ (by parts)} \\ = x e^x - e^x$$

$$4. \int e^{x^2} \, dx \text{ (by integrand in a Taylor series)} = 1 + x^2 + \frac{1}{2} x^4 \mathcal{O}(x^6) \\ x + \frac{x^3}{3} + \frac{x^5}{10} + C + \mathcal{O}(x^7)$$

$$5. \int x \sqrt{1+x} \, dx \\ = \frac{2}{15} (1+x)^{\frac{3}{2}} (-2+3x) + C$$

$$6. \int \sec \theta \, d\theta \\ = \ln (\sec \theta + \tan \theta) + C$$

$$7. \int \sec^2 \theta \, d\theta \\ = 2 \frac{\sin \theta}{\cos \theta} + C$$

$$8. \int \operatorname{sech}^2(\theta) = \int \frac{1}{\cosh^2(\theta)} \, d\theta \\ = \frac{\sinh \theta}{\cosh \theta} + C$$

$$9. \int \frac{x^2+2}{7-x^2} \, dx \\ = -x + \frac{9\sqrt{7}}{7} \arctan\left(\frac{x\sqrt{7}}{7}\right) + c$$

$$10. \int \frac{1}{ap-bp^2} \, dp \\ = \frac{\ln|p|}{a} - \frac{\ln|bp-a|}{a}$$