

Math 1a Homework Solutions

Section 5.5

4. Let $u = \sqrt{x}$. Then $du = \frac{1}{2\sqrt{x}} dx$, so $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx = \int \sin u (2 du) = 2(-\cos u) + C = -2 \cos \sqrt{x} + C$.

8. Let $u = x^2$. Then $du = 2x dx$, so $\int x e^{x^2} dx = \int e^u (\frac{1}{2} du) = \frac{1}{2} e^u + C = \frac{1}{2} e^{x^2} + C$.

12. Let $u = 2 - x$. Then $du = -dx$, so $\int (2 - x)^6 dx = \int u^6 (-du) = -\frac{1}{7} u^7 + C = -\frac{1}{7} (2 - x)^7 + C$.

19. Let $u = 3\theta$. Then $du = 3 d\theta$, so $\int \sin 3\theta d\theta = \int \sin u (\frac{1}{3} du) = \frac{1}{3} (-\cos u) + C = -\frac{1}{3} \cos 3\theta + C$.

20. Let $u = \tan^{-1} x$. Then $du = \frac{dx}{1+x^2}$, so $\int \frac{\tan^{-1} x}{1+x^2} dx = \int u du = \frac{u^2}{2} + C = \frac{(\tan^{-1} x)^2}{2} + C$.

22. Let $u = \sin x$. Then $du = \cos x dx$, so $\int \cot x dx = \int \frac{\cos x}{\sin x} dx = \int \frac{du}{u} = \ln |u| + C = \ln |\sin x| + C$.

28. Let $u = e^x + 1$. Then $du = e^x dx$, so $\int \frac{e^x}{e^x + 1} dx = \int \frac{du}{u} = \ln |u| + C = \ln(e^x + 1) + C$.