Do all work NEATLY on a separate sheet of paper!

Directions: You and your partner will **choose** the **11** problems that you want to complete for the assignment. **You must evaluate at least five quick integrals, three helpful hints u-substitution, and three intermediate u-substitution.**

Quick Integrals

1. $\int 4\sin 5x\,dx$ $-\frac{4\cos 5x}{5}+C$

2. $\int e^{3x}\,dx$ $\frac{e^{3x}}{3}+C$

3. $\int 7\sec^2(2-3x)\,dx$ $-\frac{7\tan(2-3x)}{3}+C$

4. $\int \csc(\pi x)\cot(\pi x)\,dx$ $-\frac{\csc(\pi x)}{\pi}+C$

5. $\int (2x-5)^4\,dx$ $\frac{(2x-5)^5}{5\cdot 2}+C=\frac{(2x-5)^5}{10}+C$

6. $\int \frac{e^{-5x}}{2}\,dx$ $\frac{1}{2}\cdot\frac{e^{-5x}}{-5}$ $\frac{1}{10e^{5x}}+C$

7. $\int 2\sqrt{9x-5}\,dx$ $2(9x-5)^{1/2}$ $\frac{2}{3}\cdot\frac{2(9x-5)^{3/2}}{9}$ $\frac{4(9x-5)^{3/2}}{27}+C$

8. $\int -7^{5-2x}\,dx$ $\frac{-7^{5-2x}}{-2\ln 7}+C$ $\frac{7^{5-2x}}{2\ln 7}+C$

Helpful Hints u-substitution

9. $\int \sin\theta\cos^3\theta\,d\theta$ Let u = cosθ $-\frac{\cos^4\theta}{4}+C$

10. $\int \frac{(\ln x)^3}{x}dx$ Let u = $\ln x$ $\frac{(\ln x)^4}{4}+C$

11. $\int \frac{\sec^2\sqrt{x}}{\sqrt{x}}dx$ Let u = $\sqrt{x}$ $2\tan\sqrt{x}+C$

12. $\int e^{2x}\cos(e^{2x})dx$ Let u = e^{2x} $\frac{\sin e^{2x}}{2}+C$

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

Intermediate u-substitution

14. $\int 7x^2e^{x^3}\,dx$ $\frac{7}{3}e^{x^3}+C$

15. $\int x\cdot 3^{5x^2}\,dx$ $\frac{3^{5x^2}}{10\ln 3}+C$

16. $\int \frac{10x}{8-x^2}\,dx$ $5\ln|8-x^2|+C$

17. $\int \frac{\sec^2\left(\frac{\pi}{x}\right)}{x^2}\,dx$ $\frac{-1}{\pi}\tan\left(\frac{\pi}{x}\right)+C$

18. $\int e^{3x}\sec(e^{3x})\tan(e^{3x})dx$ $\frac{1}{3}\sec(e^{3x})+C$

19. $\int \frac{\sin(\ln x)}{x}\,dx$ $-\cos(\ln x)+C$

Helpful Hints u-sub

9. $\int \sin\theta \cos^3\theta \, d\theta$ $\quad u = \cos\theta$

$\int \sin\theta \, u^3 \cdot \frac{-du}{\sin\theta}$ $\quad du = -\sin\theta \, d\theta$

$d\theta = \frac{-du}{\sin\theta}$

$-\int u^3 \, du$

$\frac{-u^4}{4} + C = \frac{-\cos^4\theta}{4} + C$

10. $\int \frac{(\ln x)^3}{x} \, dx$ $\quad u = \ln x$

$du = \frac{1}{x} dx$

$\int \frac{u^3}{x} \cdot x \, du$ $\quad dx = x \, du$

$\frac{u^4}{4} + C = \frac{(\ln x)^4}{4} + C$

11. $\int \frac{\sec^2\sqrt{x}}{\sqrt{x}}$ $\quad u = \sqrt{x}$ or $x^{1/2}$

$du = \frac{1}{2} x^{-1/2} dx$

$\int \frac{\sec^2 u}{\sqrt{x}} \cdot 2\sqrt{x} \, du$ $\quad du = \frac{1}{2\sqrt{x}} dx$

$dx = 2\sqrt{x} \, du$

$2\int \sec^2 u \, du$

$2\tan u + C$

$2\tan\sqrt{x} + C$

12. $\int e^{2x} \cos(e^{2x}) \, dx$ $\quad u = e^{2x}$

$\int e^{2x} \cos(u) \frac{1 \, du}{2e^{2x}}$ $\quad du = 2e^{2x} dx$

$dx = \frac{du}{2e^{2x}}$

$\frac{1}{2}\int \cos u \, du$

$\frac{1}{2}\sin u + C = \frac{1}{2}\sin(e^{2x}) + C$ or $\frac{\sin(e^{2x})}{2} + C$

13. ~~Do first~~ next page

13. $\int (2x+3)\sqrt{5x^2+15x}\,dx$

$\int (2x+3)\cdot u^{1/2}\,\frac{du}{5(2x+3)}$

$\frac{1}{5}\int u^{1/2}\,du$

$\frac{1}{5}\cdot\frac{2u^{3/2}}{3}+C$

$\frac{2\sqrt{(5x^2+15x)^3}}{15}+C$

$u = 5x^2+15x$

$du = 10x+15\,dx$

$du = 5(2x+3)\,dx$

$dx = \frac{du}{5(2x+3)}$

Intermediate u-sub

14. $\int 7x^2 e^{x^3}\,dx$

$\int 7x^2 e^u \frac{du}{3x^2}$

$\frac{7}{3}e^{x^3}+C$

$u = x^3$

$du = 3x^2\,dx$

$dx = \frac{du}{3x^2}$

15. $\int x \cdot 3^{5x^2}\,dx$

$\int x \cdot 3^u \frac{du}{10x}$

$\frac{1}{10}\frac{3^{5x^2}}{\ln 3}+C$

$u = 5x^2$

$du = 10x\,dx$

$dx = \frac{du}{10x}$

$\frac{3^{5x^2}}{10\ln 3}+C$

16. $\int \frac{10x}{8-x^2}\,dx$

$\int \frac{10x}{u} \cdot \frac{du}{-2x}$

$5\int \frac{1}{u}\,du$

$5\ln|8-x^2|+C$

$u = 8-x^2$

$du = -2x\,dx$

$dx = \frac{du}{-2x}$

17. $\int \frac{\sec^2\left(\frac{\pi}{x}\right)}{x^2}\,dx$

$\int \frac{\sec^2 u}{x^2} \cdot \frac{-x^2}{\pi}\,du$

$-\frac{1}{\pi}\tan\left(\frac{\pi}{x}\right)+C$

$u = \frac{\pi}{x}$ or $\pi\frac{1}{x}$ or πx^{-1}

$du = \frac{-\pi}{x^2}\,dx$

$dx = -\frac{x^2}{\pi}\,du$

18. $\int e^{3x}\sec(e^{3x})\tan(e^{3x})\,dx$

$u = e^{3x}$

$du = e^{3x}\cdot 3\,dx$

$dx = \frac{du}{3e^{3x}}$

$\int e^{3x}\sec u \tan u \frac{du}{3e^{3x}}$

$\frac{1}{3}\sec(e^{3x}) + C$

19. $\int \frac{\sin(\ln x)}{x}\,dx$

$u = \ln x$

$du = \frac{1}{x}\,dx$

$dx = x\,du$

$\int \frac{\sin u}{x}\cdot x\,du$

$-\cos(\ln x) + C$