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EXAMEN

$$\begin{aligned} 1. \int \sin^{-1} 3x^2 dx &= \sqrt{1 - (3)^2(x^2)^2} + x \sin^{-1}(3x^2) + C \\ &= \sqrt{1 - 9x^4} + x \sin^{-1} 3x^2 + C \\ &= \sqrt{\frac{1}{3} - 3x^4} + \frac{x}{\sin 3x^2} + C \end{aligned}$$

$$\begin{aligned} 2. \int \cos^{-1} 5x dx &= x \cos^{-1}(5x) - \sqrt{1 - (5)^2(x)^2} + C \\ &= \frac{x}{\cos 5x} - \sqrt{1 - 25x^2} + C \\ &= \frac{x}{\cos 5x} - \sqrt{\frac{1}{5} - 25x^2} + C \end{aligned}$$

$$\begin{aligned} 3. \int \tan^{-1} 1/x^2 dx &= x^2 \tan^{-1}(1/x^2) - \ln|(1)^2(x^2+1)| + C \\ &= x^2 \tan^{-1}(1/x^2) - \ln|(2)(x^4+1)| + C \\ &= \frac{x^2}{\tan^{-1} x^2} - \frac{\ln|3x^4|}{2} + C \end{aligned}$$

$$\begin{aligned} 4. \int \cos^3 2x dx &= \frac{1}{3} \int \cos^2 2x dx + \frac{1}{3} \int \frac{\cos^3 2x}{3} dx \\ &= \frac{1}{3} \int \cos^2 2x dx = u = 2x = \frac{1}{3} \int \cos^3 \frac{1}{2} u^3 du = \frac{1}{3} \cdot \frac{1}{2} \\ &= \frac{1}{6} \int \cos^3 \frac{1}{2} u du = \frac{1}{3} \cdot \frac{1}{2} \int \cos u \cos u du \\ &= \frac{1}{6} \left(\sin 2x - \frac{\sin^3 2}{3} x + C \right) \end{aligned}$$

$$\begin{aligned}
 5. \int \sec^4 2x \, dx &= \int \sec^2 2x \sec^2 2x \, dx \\
 &= \int (1 + \tan^2 2x) \sec^2 2x \, dx \\
 &= \frac{1}{2} \int (1 + \tan^2 2x) \sec^2 2x (2) \, dx \\
 &= \frac{1}{2} \int (1 + u^2) \, dx \\
 &= \frac{1}{2} \left(u + \frac{u^3}{3} \right) + C = \frac{1}{2} u + \frac{1}{6} u^3 + C \\
 &= \frac{1}{2} \tan 2x + \frac{1}{6} \tan^3 2x + C
 \end{aligned}$$

$$\begin{aligned}
 6. \int \csc^{-1} 2x^2 \, dx &= \ln | 2\sqrt{(2)^2(x^2)^2 - 1 + 2x^2} \\
 &+ x^2 \csc^{-1}(2x^2) - 2x^2 \sqrt{1 - \csc^{-1} 2x^2} + C \\
 &= \ln | 2\sqrt{4x^4 - 1 + 2x^2} + \frac{x^2}{\csc 2x^2} + C \\
 &= \ln | 2\sqrt{3x^4} + \frac{x^2}{\csc 2x^2} + C
 \end{aligned}$$

$$\begin{aligned}
 7. \int \cot^{-1} \sqrt{2} x \, dx &= \ln | \frac{\sqrt{2} (x)^2 + 1 + x \cot^{-1} \sqrt{2} x}{2(\sqrt{2})} \\
 &= \ln | \frac{3x^2}{2 \cdot \sqrt{2}} + \frac{x}{\cot \sqrt{2} x} + C
 \end{aligned}$$

$$\begin{aligned}
 8. \int \operatorname{Sen}^{-1} \sqrt{2x^2} dx &= \int \operatorname{Sen}^{-1} \left(\frac{\sqrt{2} (x^2)^{1/2}}{\sqrt{2}} \right) dx \\
 &= \operatorname{Sen}^{-1} (\sqrt{2} x^2) + C \\
 &= \frac{\sqrt{1-2x^4}}{\sqrt{4}} + \frac{x^2}{\operatorname{Sen} \sqrt{2x^2}} + C \\
 &= \frac{\sqrt{1-4x^4}}{2} + \frac{x^2}{\operatorname{Sen} \sqrt{2x^2}} + C
 \end{aligned}$$

$$9. \int \operatorname{Senh}^{-1} |x^2| dx =$$

$$\begin{aligned}
 y' &= \operatorname{Senh}^{-1} \left(\frac{x}{2} \right) + x \frac{1/2}{\sqrt{1 + \left(\frac{x}{2} \right)^2}} = \frac{2x}{2\sqrt{6x^2}} - \operatorname{Senh}^{-1} \left(\frac{x}{2} \right) \\
 &+ \frac{x}{\sqrt{6x^2}} + \frac{x}{\sqrt{6x^2}} = \operatorname{Senh}^{-1} \left(\frac{x}{2} \right)
 \end{aligned}$$

$$10. \int \operatorname{Senh} 2x dx = \int \left(\frac{e^x - e^{-x}}{2} \right) dx =$$

$$= \int \left(\frac{e^x - e^{-x}}{4} \right) dx = \frac{1}{4} \int (e^x)^2 - 2 + (e^{-x})^2$$

$$= \frac{1}{4} \int e^{2x} - 2 + e^{-2x} dx$$

$$= \frac{1}{4} \left(\frac{1}{2} e^{2x} - 2x - \frac{1}{2} e^{-2x} \right) + C$$

$$= \frac{1}{2} x + \frac{1}{4} \left(\frac{e^{2x} - e^{-2x}}{2} \right) + C$$