

Review Answers – Integration by Substitution

$$1. \int (3-2x)^3 dx = -\frac{1}{8}(3-2x)^4 + C$$

$$2. \int \sqrt{4+9x} dx = \frac{2}{27}(4+9x)^{3/2} + C$$

$$3. \int x \sec^2(x^2) dx = \frac{1}{2} \tan x^2 + C$$

$$4. \int 4x \tan(x^2) dx = -2 \ln |\cos x^2| + C$$

$$5. \int \frac{\sin 3x}{2 + \cos 3x} dx = -\frac{1}{3} \ln |2 + \cos 3x| + C$$

$$6. \int \frac{1}{4+9x^2} dx = \frac{1}{6} \arctan \frac{3x}{2} + C$$

(hint: factor out a 4 from the denominator)

$$7. \int \frac{\sec(\ln x) \tan(\ln x)}{x} dx = \sec(\ln x) + C$$

$$8. \int e^{\cot x} \csc^2(x) dx = -e^{\cot x} + C$$

$$9. \int \frac{x}{\sqrt{1-x^4}} dx = \frac{1}{2} \arcsin x^2 + C$$

$$10. \int \cos^5(7x) \sin(7x) dx = -\frac{1}{42} \cos^6(7x) + C$$

$$11. \int x\sqrt{5-x} dx = -\frac{10}{3}(5-x)^{3/2} + \frac{2}{5}(5-x)^{5/2} + C$$

$$12. \int \frac{e^{\tan^{-1} x}}{1+x^2} dx = e^{\tan^{-1} x} + C$$

$$13. \int \frac{e^{\sqrt{x-2}}}{\sqrt{x-2}} dx = 2e^{\sqrt{x-2}} + C$$

$$14. \int \frac{dx}{x \ln x} = \ln |\ln x| + C$$

$$15. \int (3x+1) \tan(3x^2+2x) dx = -\frac{1}{2} \ln |\cos(3x^2+2x)| + C$$

$$16. \int \sec(\sin \theta) \tan(\sin \theta) \cos \theta d\theta = \sec(\sin \theta) + C$$

$$17. \int \frac{e^{-x}}{4+e^{-2x}} dx = -\frac{1}{2} \arctan\left(\frac{e^{-x}}{2}\right) + C$$

$$18. \int \frac{\cos(\ln x)}{x} dx = \sin(\ln x) + C$$

$$19. \int \frac{e^x}{\sqrt{1-e^{2x}}} dx = \arcsin e^x + C$$

$$20. \int \frac{x}{\sec(x^2)} dx = \frac{1}{2} \sin x^2 + C$$

$$21. \int x4^{-x^2} dx = -\frac{1}{2 \ln 4} 4^{-x^2} + C$$

$$22. \int 2^{\pi x} dx = \frac{1}{\pi \ln 2} 2^{\pi x} + C$$

$$23. \int \frac{dx}{\sqrt{x} 3^{\sqrt{x}}} = -\frac{2}{\ln 3} 3^{-\sqrt{x}} + C$$

Thanks to Ms. Eskridge for the handout!