Math 240 Formulas

Chapter4, 5,6

Dr. Khalili Spring 2008

1. $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C \;\; if \;\; n \neq -1$

2. $\mathbf{ln}(x) = \int_1^x \frac{1}{t}\,dt$

3. $\frac{d}{dx}[\mathbf{ln}u] = \frac{u'}{u},\; u > 0$

4. $\frac{d}{dx}[\mathbf{ln}|u|] = \frac{u'}{u},$

5. $\int \frac{1}{u}\,du = \mathbf{ln}|u| + C$

6. $\int \frac{u'}{u}\,dx = \mathbf{ln}|u| + C$

7. $\int \mathbf{sin}u\,du = -\mathbf{cos}u + C$ $\qquad$ $\int \mathbf{cos}u\,du = \mathbf{sin}u + C$

8. $\int \mathbf{sec}^2u\,du = \mathbf{tan}u + C$ $\qquad$ $\int \mathbf{csc}^2u\,du = -\mathbf{cot}u + C$

9. $\int \mathbf{tan}u\,du = -\mathbf{ln}|\mathbf{cos}u| + C$ $\qquad$ $\int \mathbf{cot}u\,du = \mathbf{ln}|\mathbf{sin}u| + C$

10. $\int \mathbf{sec}u\,du = \mathbf{ln}|\mathbf{sec}u + \mathbf{tan}u| + C$ $\qquad$ $\int \mathbf{csc}u\,du = -\mathbf{ln}|\mathbf{csc}u + \mathbf{cot}u| + C$

11. $y = e^x$ **if and only if** $x = \mathbf{ln}y$ $\qquad$ $\mathbf{ln}(e^x) = x$ **and** $x = \mathbf{ln}y$

12. $\frac{d}{dx}[e^x] = e^x\,,$ $\qquad$ $\frac{d}{dx}[e^u] = e^u\,\frac{du}{dx}\,,$

13. $\int e^x\,dx = e^x + C$ $\qquad$ $\int e^u\,du = e^u + C$

14 $a^x = e^{(\mathbf{ln}a)\,x}$ $\qquad$ $\mathbf{log}_a x = \frac{1}{\mathbf{log}_a}\,\mathbf{log}x$ $\qquad$ **(change of base formula)**

15. $\frac{d}{dx}[a^x] = (\mathbf{ln}a)\,a^x\,,$ $\qquad$ $\frac{d}{dx}[a^u] = (\mathbf{ln}a)\,a^u\,\frac{du}{dx}\,,$

16. $\frac{d}{dx}[\mathbf{log}_a|x|] = \frac{1}{(\mathbf{ln}a)\,x},$ $\qquad$ $\frac{d}{dx}[\mathbf{log}_a|u|] = \frac{1}{(\mathbf{ln\ a})\,u}\,\frac{du}{dx}$

17. $\int a^x\,dx = \left(\frac{1}{\mathbf{ln}a}\right)a^x + C$

18. $y = \mathbf{arcsin}\,x \;\; iff \;\; \mathbf{sin}y = x,\; -1 \le x \le 1 \;\; -\frac{\pi}{2} \le y \le \frac{\pi}{2}$

19. $y = \mathbf{arccos}\,x \;\; iff \;\; \mathbf{cos}y = x,\; -1 \le x \le 1 \;\; 0 \le y \le \pi$

20. $y = \mathbf{arctan}\,x \;\; iff \;\; \mathbf{tan}y = x,\; -\infty < x < \infty \;\; -\frac{\pi}{2} < y < \frac{\pi}{2}$

21. $y = \mathbf{arccot}\,x \;\; iff \;\; \mathbf{cot}y = x,\; -\infty < x < \infty \;\; 0 < y < \pi$

22. $y = \mathbf{arcsec}\,x \;\; iff \;\; \mathbf{sec}y = x,\; |x| \ge 1 \;\; 0 \le y \le \pi \;\; y \neq \frac{\pi}{2}$

23. $y = \mathbf{arccsc}\,x \;\; iff \;\; \mathbf{csc}y = x,\; |x| \ge 1 \;\; -\frac{\pi}{2} \le y \le \frac{\pi}{2} \;\; y \neq 0$

24. $\frac{d}{dx}[\mathbf{arcsin}\,u] = \frac{u'}{\sqrt{1-u^2}}$ $\qquad$ $\frac{d}{dx}[\mathbf{arccos}\,u] = \frac{-u'}{\sqrt{1-u^2}}$

25. $\frac{d}{dx}[\mathbf{arctan}\,u] = \frac{u'}{1+u^2}$ $\qquad$ $\frac{d}{dx}[\mathbf{arccot}\,u] = \frac{-u'}{1+u^2}$

26. $\frac{d}{dx}[\mathbf{arcsec}\,u] = \frac{u'}{|u|\sqrt{u^2-1}}$ $\qquad$ $\frac{d}{dx}[\mathbf{arccsc}\,u] = \frac{-u'}{|u|\sqrt{u^2-1}}$

27. $\int \frac{du}{\sqrt{a^2-u^2}} = \mathbf{arcsin}(\frac{u}{a}) + C$ $\qquad$ $\int \frac{du}{a^2+u^2} = \frac{1}{a}\mathbf{arctan}(\frac{u}{a}) + C$

28. $\int \frac{du}{u\sqrt{u^2-a^2}} = \frac{1}{a}\mathbf{arcsec}(\frac{|u|}{a}) + C$