

Homework #0
2013 Will not be graded,

Math 527, UNH spring

Instructions: Differential equations require a good knowledge of calculus. You should be able to do these problems easily and with confidence. Problems 1–21 are especially simple –you should be able to do them in your head. The other problems will require more work –integration by parts in a few cases. Provide your work for these on attached sheets. One problem cannot be further simplified, the only decent answer is “ $X = X$ ”, where “ $X =$ ” is the original problem statement. And remember: Always Write Equations!

1. $\frac{d}{dx} 6x^3 =$

2. $\frac{d}{dx} 2x^{-1} =$

3. $\frac{d}{dx} ax^n =$

4. $\frac{d}{dx} \sum_{n=0}^N a_n x^n =$

5. $\frac{d}{dt} (a \cos \omega t + b \sin \omega t) =$

6. $\frac{d}{dx} e^{\alpha x} =$

7. $\frac{d}{dx} \ln \mu x =$

8. $\frac{d}{dx} \sin \alpha x^2 =$

9. $\frac{d}{dx} x^2 \sin \alpha x =$

10. $\frac{d}{dx} \frac{x^2}{\sin \alpha x} =$

11. $\frac{d}{dx} \sum_{n=0}^{\infty} \frac{1}{n!} \lambda^n x^n =$

12. $\frac{d}{dx} \int f(x) dx =$

13. $\frac{d}{dx} \int_0^x f(s) ds =$

14. $\int 8x^3 dx =$

15. $\int_0^1 8x^3 dx =$

16. $\int_0^y 8x^3 dx =$

17. $\int \sum_{n=0}^N a_n x^n dx =$

18. $\int \frac{1}{x} dx =$

19. $\int \frac{d}{dx} f(x) dx =$

20. $\int \frac{dy}{dx} dx =$

21. $\int \frac{d^ny}{dx^n} dx =$

22. $\int y dx =$

23. $\int \ln x dx =$

24. $\int \tan^{-1} x dx =$

25. $\int \sum_{n=0}^{\infty} \frac{1}{n!} \lambda^n x^n dx =$

26. Solve the system $3x^2 - 2y = 0$, $4x + y = 1$ for x and y .

Some Greek letters and their typical use in mathematics.

α	alpha	real-valued constant
β	beta	real-valued constant
γ	gamma	real-valued constant
ϵ	epsilon	infinitesimal or very small constant
λ	lambda	eigenvalue or coefficient in an exponent
θ	theta	an angle
μ	mu	parameter or coefficient in an exponent
ν	nu	parameter
ξ	xi	space-like variable, pronounced "cksee"
σ	sigma	time-like variable
τ	tau	time-like variable
ϕ	phi	function
ψ	psi	function
ω	omega	frequency, i.e. coefficient of t in $\cos \omega t$