Practice calculus problems (ungraded) **Math 527, UNH spring 2018**

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 these in your head, more or less. One problem cannot be further simplified. 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. $\int \frac{1}{3x-7} \, dx =$

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

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

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

22. $\int y(x) \, dx =$

23. $\int \frac{\cos x}{\sin^2 x} dx =$

24. $\int x e^{ax} \, dx =$

25. $\int \frac{x}{x^2+4x-5x} dx =$

26. $\int \ln x \, dx =$

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

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

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 $\cos \omega t$