

Find y' and find y'' 11/3/01 3:56:43 PM (Updated) (These are just for FUN - some are very difficult which is why they're fun)

1. $y = e^x$

2. $y = e^{2t}$

3. $y = e^{x^2}$

4. $y = e^{2x^2}$

5. $y = e^2$ ☺

6. $y = xe^x$

7. $y = x^2e^x$

8. $y = 2t^2e^t$

9. $y = \int e^{x^2} dx$

10. $y = c_1e^{2x}$ where c_1 is a constant

11. $y = e^{3x} + 10e^{2x}$

12. $y = \frac{1}{2}\sin x - \frac{1}{2}\cos x + 10e^{-x}$

13. $y = 5 \tan t$

14. $y = x \ln x, x > 0$

15. $y = e^{mx}$, m is a real number

Integrate

16. $\int \cos x dx$

17. $\int \sin 5x dx$

18. $\int (-x^2 - x^{-1}) dx$

19. $\int \frac{\ln x}{x} dx$

20. $\int \ln t dt$

21. $\int \frac{1}{12} \cdot \frac{\cos 3x}{\sin 3x} dx$

deriv_int_review.doc
Review of Finding
Integrals and Derivatives

Answers (may not be totally factored)

1. $y' = e^x, y'' = e^x$

2. $y' = 2e^{2t}, y'' = 4e^{2t}$

3. $y' = 2xe^{x^2}, y'' = (4x^2 + 2)e^{x^2}$

4. $y' = 4xe^{2x^2}, y'' = (16x^2 + 4)e^{2x^2}$

5. $y' = 0, y'' = 0$

6. $y' = (x+1)e^x, y'' = (x+2)e^x$

7. $y' = (x^2 + 2x)e^x, y'' = (x^2 + 4x + 2)e^x$

8. $y' = (2t^2 + 4t)e^t, y'' = (2t^2 + 8t + 4)e^t$

9. $y' = e^{x^2}, y'' = 2xe^{x^2}$

10. $y' = 2c_1e^{2x}, y'' = 4c_1e^{2x}$, or $y'' = ce^{2x}$ where $c = 4c_1$

11. $y' = 3e^{3x} + 20e^{2x}, y'' = 9e^{3x} + 40e^{2x}$

$y' = -10e^{-x} + \frac{1}{2}\cos x + \frac{1}{2}\sin x, y'' = 10e^{-x} + \frac{1}{2}\cos x - \frac{1}{2}\sin x$

13. $y' = 5\sec^2 t, y'' = 10 \tan t \sec^2 t$

14. $y' = \ln x + 1, y'' = x^{-1}, x > 0$

15. $y' = me^{mx}, y'' = m^2e^{mx}$, m is a real number

 16. $\int \cos x dx = \sin x + c$

17. $\int \sin 5x dx = -\cos 5x / 5 + c$

18. $\int (-x^2 - x^{-1}) dx = -\ln x - x^3 / 3 + c$

19. $\int \frac{\ln x}{x} dx = \frac{(\ln x)^2}{2} + c$

20. $\int \ln t dt = t \ln t - t + c$

21. $\int \frac{1}{12} \cdot \frac{\cos 3x}{\sin 3x} dx = \frac{1}{36} \ln(\sin 3x) + c$

This has been checked twice...no known errors as of 11/3/01

$$22. \int (1+x)^2 dx$$

$$23. \int -e^{-3x} dx$$

$$24. \int \frac{-e^x}{(e^x+1)^3} dx$$

$$25. \int \frac{x+6}{x+1} dx$$

$$26. \int \frac{x}{(1+x^2)^{3/2}} dx$$

$$27. \int_0^{\infty} e^{-st} dt, s > 0$$

$$28. \int 2xe^{-x} dx$$

$$29. \int \frac{1}{2 \sin y \cos y} dy$$

$$30. \int_0^{\infty} te^{-st} dt, s > 0$$

$$31. \int \frac{4}{x} dx$$

$$32. \int \frac{1}{x^2} dx$$

$$33. \int \frac{e^x}{e^{2x}+1} dx$$

$$34. \int \frac{1+x}{x^2} dx$$

$$35. \int \frac{1}{x+\sqrt{x}} dx \text{ (try } u^2 = x)$$

$$36. \int \frac{t}{4+t^2} dt$$

$$37. \int \frac{1}{P+P^2} dP$$

$$38. \int te^{4t} dt$$

$$39. \int (te^{t+2} - 1) dt$$

$$40. \int e^t \cos t dt$$

$$41. \int_0^{\infty} e^{-st} \cos t dt, s > 0$$

Answers (may not be totally factored)

$$22. \int (1+x)^2 dx = \frac{1}{3}(x+1)^3 + c$$

$$23. \int -e^{-3x} dx = \frac{1}{3}e^{-3x} + c$$

$$24. \int \frac{-e^x}{(e^x+1)^3} dx = \frac{1}{2(e^x+1)^2} + c$$

$$25. \int \frac{x+6}{x+1} dx = 5 \ln|x+1| + x + c$$

$$26. \int \frac{x}{(1+x^2)^{3/2}} dx = \sqrt{x^2+1} + c$$

$$27. \int_0^{\infty} e^{-st} dt = 1/s, s > 0$$

$$28. \int 2xe^{-x} dx = -2(x+1)e^{-x} + c$$

$$29. \int \frac{1}{2 \sin y \cos y} dy = \frac{1}{2} \ln|\csc 2y - \cot 2y| + c \text{ (use table)}$$

$$30. \int_0^{\infty} te^{-st} dt = 1/s^2, s > 0$$

$$31. \int \frac{4}{x} dx = 4 \ln|x| + c$$

$$32. \int \frac{1}{x^2} dx = -1/x + c$$

$$33. \int \frac{e^x}{e^{2x}+1} dx = \tan^{-1} e^x + c$$

$$34. \int \frac{1+x}{x^2} dx = \ln|x| - 1/x + c$$

$$35. \int \frac{1}{x+\sqrt{x}} dx = 2 \ln(\sqrt{x}+1) + c \text{ (try } u^2 = x)$$

$$36. \int \frac{t}{4+t^2} dt = \frac{1}{2} \ln(t^2+4) + c$$

$$37. \int \frac{1}{P+P^2} dP = \ln|P| - \ln|P+1| + c$$

$$38. \int te^{4t} dt = \left(\frac{t}{4} - \frac{1}{16} \right) e^{4t} + c$$

$$39. \int (te^{t+2} - 1) dt = (t-1)e^{t+2} - t + c$$

$$40. \int e^t \cos t dt = \frac{1}{2} e^t (\cos t + \sin t) + c$$

$$41. \int_0^{\infty} e^{-st} \cos t dt = \frac{s}{s^2+1}, s > 0$$