MA114 Worksheet for Section 6.3

Skills

Evaluate the following integrals using the integral table provided. Making substitutions or completing the square may prove to be essential.

1. $\displaystyle\int \frac{\sqrt{1-x^2}}{x}\,dx$
2. $\displaystyle\int x^4 e^{-x}\,dx$
3. $\displaystyle\int y^2\sqrt{4y^2-25}\,dy$
4. $\displaystyle\int \sin^6(3\theta)\,d\theta$
5. $\displaystyle\int xe^{2x+1}\,dx$
6. $\displaystyle\int \frac{3\,dx}{x^2+4x-5}$
7. $\displaystyle\int \sqrt{x^2-6x+3}\,dx$
8. $\displaystyle\int (e^x+e^{2x})\ln(1+e^x)\,dx$
9. $\displaystyle\int e^{2t}\sin(3e^{2t})\sin(-e^{2t})\,dt$
10. $\displaystyle\int \frac{\ln x\sin(\ln x)}{x}\,dx$
11. $\displaystyle\int \sin(2t)\cos^2(2t)e^{3\cos(2t)}\,dt$
12. $\displaystyle\int x^3\cos(x^2)\,dx$
13. $\displaystyle\int \sqrt{1+\cos^2 x}\tan x\,dx$
14. $\displaystyle\int \frac{\sqrt{x^{10}-3}}{x}\,dx$
15. $\displaystyle\int xe^{(n+1)x}\,dx$

Concepts

1. Use formula 1. on the integral table to show $\displaystyle\int \frac{du}{u^2-a^2} = \frac{1}{2a}\ln\left|\frac{u-a}{u+a}\right| + C$
2. Verify formula 5. on the integral table by making the substitution $u = a\sin\theta$ and making use of the identity $\sin^2\theta + \cos^2\theta = 1$ and formula 14.
3. Verify that $\displaystyle\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^3}\left(a+bu-\frac{a^2}{a+bu}-2a\ln|a+bu|\right)+C$ by
   (a) differentiation;
   (b) using the substitution $t = a+bu$.

Maple

A printout of your Maple worksheet should be turned in with your results.

1. Use the int command to verify some of the formulas given on the integral table. In some cases, Maple will provide an answer that is not exactly the same as the answer given on the table. Use algebraic means to show that the two answers are in fact the same.

2. Use the int command to evaluate some of the integrals given above. Again, Maple may provide an answer that is somewhat different from your own. Try to rectify the two answers. Sometimes Maple will not be able to evaluate the integral, or its answer will be too complicated. If this happens, check your answer using diff. **WARNING:** It may take Maple a little while to perform some of these calculations. You might want to have Maple working on a problem at the same time you are so you don't run out of time.