MATH 112 SOLUTIONS FOR 5.7, P. 418

1. (b) $\frac{3}{7}(1+2^{7/3})$. (d) $\frac{3}{4}(6^{4/3}-2^{4/3})$. (f) $(x^2+9)^{3/2}+C$. (g) $\frac{1}{4}(\frac{1}{9}-\frac{1}{225})$. (h) $\frac{1}{2}\ln(x^2+1)+C$. (j) $\frac{2}{3}(1+x^{3/5})^{3/2}+C$. (l) $5^{3/2}-2^{3/2}$.
2. (b) $-\frac{1}{3}\cos^3 x+C$. (c) $\sin x+\frac{1}{4}\sin^4 x+C$. (d) $\frac{1}{2}$. (f) $2\sin\sqrt{x}+C$. (g) $\ln|\sin x|+C$. (h) $\ln|\sec x|+C$. (j) $-\frac{1}{a}\cos ax+C$. (l) $\frac{1}{a}\ln|\sec ax|+C$.
3. (b) $\frac{1}{2}(e^5-e^{-1})$. (d) $-\frac{3}{2}e^{-x^2/3}+C$. (f) $\dfrac{10^{-3x}}{3\ln 10}+C$. (g) $2(e^{\sqrt{2}}-e)$. (h) $\ln(1+e^x)+C$. (j) $\ln|\ln x|+C$. (k) $\frac{1}{4}\cosh^4 x+C$. (l) $\tan^{-1}e^x+C$.
4. (b) $\frac{6}{5}(x+5)^{5/2}-10(x+5)^{3/2}+C$. (d) $x-5\ln|x+5|+C$. (f) $\frac{1}{5}(9-x^2)^{5/2}-3(9-x^2)^{3/2}+C$.
5. (b) $\int\frac{1}{ax+b}dx=\frac{1}{a}\int\frac{a\,dx}{ax+b}=\frac{1}{a}\int\frac{dw}{w}=\frac{1}{a}\ln|w|+C=\frac{1}{a}\ln|ax+b|+C$.
   (c) $\displaystyle\int\frac{1}{x^2+a^2}dx=\frac{1}{a}\int\frac{(1/a)dx}{1+(\frac{x}{a})^2}=\frac{1}{a}\int\frac{dw}{1+w^2}=\frac{1}{a}\tan^{-1}w+C=\frac{1}{a}\tan^{-1}\frac{x}{a}+C$.
   (d) $\displaystyle D_x(\sin^{-1}\tfrac{x}{a}+C)=\frac{1/a}{\sqrt{1-x^2/a^2}}=\frac{1}{\sqrt{a^2-x^2}}$.
6. To substitute $u=x^3+1$, we must have the derivative, x^2, as a factor of the integrand. If x^3 or x^4 are factors of the integrand, factors of x or x^2 are left over, which we cannot express easily in terms of u.
11. Use L'Hôpital.