University of Nottingham
UK | CHINA | MALAYSIA

Foundation Calculus and Mathematical Techniques (CELEN037)

Answers to Worksheet #7

---

1. (i) $\frac{1}{2}\ln|4x-3| - \frac{1}{2}\ln|2x+1| + C$ (ii) $\ln|3x-2| - \ln|2x+3| + C$

   (iii) $\ln|x-1| + 2\ln|x+2| + C$ (iv) $2\ln|x+5| - \ln|x-2| + C$

   (v) $4\ln|x+4| + \ln|x-3| + C$ (vi) $\frac{8}{7}\ln|x-3| + \frac{13}{7}\ln|x+4| + C$

2. (i) $\ln|x-4| - \frac{1}{2}\ln(x^2+4) - 2\tan^{-1}\left(\frac{x}{2}\right) + C$

   (ii) $\ln|x+1| - \frac{\ln(x^2+2)}{2} + \frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{x}{\sqrt{2}}\right) + C$

   (iii) $\ln|x-4| - \frac{\ln(x^2+1)}{2} - 4\tan^{-1}x + C$

   (iv) $\ln|x-1| - \frac{\ln(x^2+9)}{2} - \frac{1}{3}\tan^{-1}\left(\frac{x}{3}\right) + C$

3. (i) $-\ln|x-3| - \frac{5}{x-3} + \ln|x+2| + C$ (ii) $-\ln|x-2| - \frac{3}{x-2} + \ln|x+1| + C$

4. (i) $-x\cos x + \sin x + C$ (ii) $\frac{x^3\ln x}{3} - \frac{x^3}{9} + C$

   (iii) $\frac{x^3\sin^{-1}x}{3} - \frac{(1-x^2)^{\frac{3}{2}}}{9} + \frac{\sqrt{1-x^2}}{3} + C$ (iv) $x\cos^{-1}x - \frac{\sqrt{1-x^2}}{2} + C$

   (v) $\frac{(x^2+1)\tan^{-1}x}{2} - \frac{x}{2} + C$ (vi) $x\tan x + \ln|\cos x| + C$

5. (i) $\frac{e^{x^2}(x^2-1)}{2} + C$ (ii) $4\sqrt{x}\left(\ln\sqrt{x} - 1\right) + C$

   (iii) $\frac{x\big(\sin(\ln x) - \cos(\ln x)\big)}{2} + C$

6. (i) $\ln 2 + 1$ (ii) $1 - \frac{\pi}{4}$ (iii) $\ln 2$ (iv) $\ln\left(\frac{3}{2}\right)$ (v) $\ln 2$ (vi) $\ln 2$