



## Cal II (S) (Maths 201–NYB)

**Answers**

1. The integrals:

(a)  $\frac{1}{2} \ln 2 - \frac{1}{4}$       (b)  $\frac{1}{3}(x^2 - 9)^{3/2} + 9\sqrt{x^2 - 9} + C$

(c)  $\frac{\pi}{4} - \frac{1}{2} \ln 2$       (d)  $-\frac{1}{2}x^3 \cos 2x + \frac{3}{4}x^2 \sin 2x + \frac{3}{4}x \cos 2x - \frac{3}{8} \sin 2x + C$

(e)  $x^2 + 4x + \frac{1}{4} \ln |x| - \frac{1}{2x} + \frac{31}{4} \ln |x - 2| + C$

(f)  $\arcsin((x - 1)/2) + C$

2. The limits:

(a)  $3/2$       (b)  $-2$       (c)  $e^{-4/3}$       (d)  $\infty$

3. The improper integrals:

(a) diverges      (b)  $\frac{1}{2}$  (*i.e.* converges)

4.  $x = c\sqrt{\frac{y-1}{y+1}}$  or  $y = \frac{1+cx^2}{1-cx^2}$

5. (a)  $\int_0^{\pi/4} (\cos x - \sin x) dx$       (b)  $2\pi \int_0^{\pi/4} (x + 1)(\cos x - \sin x) dx$

(c)  $\pi \int_0^{\pi/4} (\cos^2 x - \sin^2 x) dx$

6.  $\frac{3}{8} + \ln 2$