Example set 1.2.3

1. $\int_1^2 (3x^2 + 4x + 5)\,dx$

$= \left[\frac{3x^{2+1}}{2+1} + \frac{4x^{1+1}}{1+1} + 5x\right]_1^2$

$= \left[\frac{3x^3}{3} + \frac{4x^2}{2} + 5x\right]_1^2$

$= \left[x^3 + 2x^2 + 5x\right]_1^2$

$= (2^3 + 2.2^2 + 5.2) - (1^3 + 2.1^2 + 5.1)$

$= (8 + 8 + 10) - (1 + 2 + 5)$

$= 26 - 8$

$= 18$

2. $\int_1^e \frac{1}{x}\,dx$

$= \left[\ln x\right]_1^e$

$= \ln e - \ln 1$

$= 1$

3. $\int_0^{\pi/2} \sin 2x\,dx$

$= \left[-\frac{1}{2}\cos 2x\right]_0^{\pi/2}$

$= -\left(\frac{1}{2}\cos 2\cdot\frac{\pi}{2} - \frac{1}{2}\cos 2\cdot 0\right)$

$= -\left(\frac{1}{2}\cos\pi - \frac{1}{2}\cos 0\right)$

$= -\left(-\frac{1}{2} - \frac{1}{2}\right)$

$= 1$

Example set 1.2.4

$\int_0^4 \sqrt{2x+1}\,dx$

$= \int_1^9 \sqrt{u}\cdot\frac{du}{2}$

$= \frac{1}{2}\int_1^9 u^{1/2}\,du$

$= \frac{1}{2}\left[\frac{u^{3/2}}{3/2}\right]_1^9$

$= \frac{1}{2}\cdot\frac{2}{3}\left[9^{3/2} - 1^{3/2}\right]$

$= \frac{1}{3}\left[27 - 1\right]$

$= \frac{26}{3}$

Set $u = 2x+1$

$du = 2\,dx$

$dx = \frac{du}{2}$

x	u
0	1
4	9