

# Integration by Substitution

## Changing the limits

1.  $\int_0^{\sqrt{2}} \frac{x^2}{\sqrt{4-x^2}} dx = \frac{\pi}{2} - 1$ , use  $x = 2 \sin \theta$

2.  $\int_1^{\sqrt{2}} \frac{1}{x^2 \sqrt{4-x^2}} dx = \frac{1}{4}(\sqrt{3}-1)$ , use  $x = 2 \cos \theta$

3.  $\int_0^1 \frac{1}{(1+x^2)^2} dx = \frac{1}{8}(\pi+2)$ , use  $x = \tan \theta$

4.  $\int_{\sqrt{2}}^2 \frac{1}{x^2 \sqrt{x^2-1}} dx = \frac{1}{2}(\sqrt{3}-\sqrt{2})$ , use  $x = \sec \theta$

5.  $\int_0^{\frac{3}{4}} \frac{1}{\sqrt{3-4x^2}} dx$  use  $x = \frac{\sqrt{3}}{2} \sin \theta$

6.  $\int_0^1 \frac{1}{(1+3x^2)^{\frac{3}{2}}} dx$  use  $x = \frac{1}{\sqrt{3}} \tan \theta$

7.  $\int_0^1 \frac{1}{\sqrt{2-x^2}} dx$  use  $x = \sqrt{2} \sin \theta$

8.  $\int_0^{\frac{1}{2}} \frac{1}{4x^2+3} dx$  use  $x = \frac{\sqrt{3}}{2} \tan \theta$

9.  $\int_0^1 \frac{1}{(4-x^2)^{\frac{3}{2}}} dx$  use  $x = 2 \sin \theta$