

$$8. \quad \frac{d}{dx} \left(\ln \left(\frac{2+x}{2-x} \right) \right) = \frac{d}{dx} \{ \ln(2+x) - \ln(2-x) \}$$

$$= \frac{1}{2+x} - \frac{-1}{2-x} = \frac{2-x + (2+x)}{4-x^2} = \frac{4}{4-x^2}$$

$$\text{hence } \int \frac{1}{4-x^2} dx = \frac{1}{4} \ln \left(\frac{2+x}{2-x} \right) + C$$

$$9. \quad \frac{d}{dx} \ln(\cos x) = \frac{-\sin x}{\cos x}$$

$$\text{hence } \int_0^{\frac{\pi}{3}} \tan x \, dx = -[\ln(\cos x)]_0^{\frac{\pi}{3}} = 0 - \ln \frac{1}{2} = \ln 2$$

• AREA AND VOLUME

1.

a) $A = \int_a^b f(x) dx = \int_a^b y \, dx$

b) $A = \int_c^d g(y) dy = \int_a^b x \, dy$

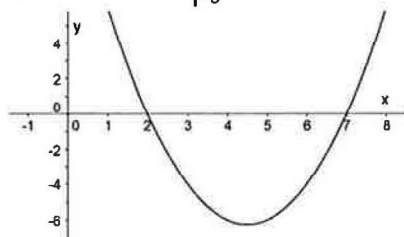
c) $A = \int_a^b f(x) - g(x) dx$

d) $V = \pi \int_a^b y^2 \, dx$

e) $V = \pi \int_c^d x^2 \, dy$

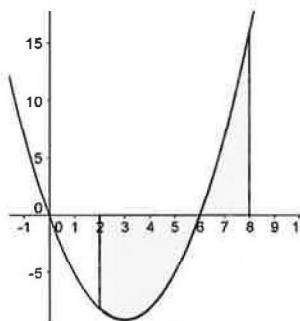
2.

a) $A = \left| \int_3^6 x^2 - 9x + 14 \, dx \right|$



b) $A = \left| \int_2^6 x^2 - 6x \, dx \right| + \int_6^8 x^2 - 6x \, dx$

$$= \frac{80}{3} + \frac{44}{3} = 41 \frac{1}{3}$$



c) $A = \int_{-1/2}^{1/2} (2x+1)^2 \, dx - \frac{1}{2} \times \frac{1}{2} \times 4$

