

## 25.4 Cont'd

Ex: Evaluate  $\int_0^1 (x^2 + 2x^5) \sqrt{x^3 + x^6} dx$

$$\begin{aligned} \text{Sub } u &= x^3 + x^6 \\ du &= (3x^2 + 6x^5) dx \\ (x^2 + 2x^5) dx &= ? \\ (x^2 + 2x^5) dx &= \frac{du}{3} \\ \text{if } x=0, & \quad u=0 \\ x=1, & \quad u=2 \end{aligned}$$

$$\begin{aligned} \int &= \int_0^2 \frac{\sqrt{u} du}{3} \\ &= \frac{1}{3} \int_0^2 u^{1/2} du \\ &= \frac{1}{3} \left[ \frac{2}{3} u^{3/2} \right]_0^2 \\ &= \frac{2}{9} (2^{3/2} - 0) \\ &= \frac{2^{5/2}}{9} \end{aligned}$$

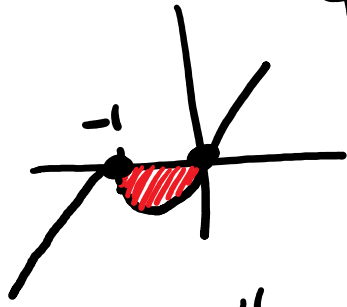
Ex: Evaluate  $\int_{-1}^0 x(x+1)^6 dx$

$$\begin{aligned} u &= x+1 \\ \cancel{du} &= \cancel{dx} \quad du = dx \\ x &= ? \\ x &= u-1 \\ \text{when } x &= -1, u = 0 \\ x &= 0, u = 1 \end{aligned}$$

$$\begin{aligned} \int &= \int_0^1 \underbrace{(u-1)} u^6 du \\ &= \int_0^1 (u^7 - u^6) du \\ &= \left[ \frac{u^8}{8} - \frac{u^7}{7} \right]_0^1 \\ &= \frac{1}{8} - \frac{1}{7} - (0) \\ &= \underline{\underline{-\frac{1}{56}}} \end{aligned}$$

Note: Integral is  $\ominus$   
because  $f(x)$  is below  $x$ -axis

$$f(x) = x(x+1)^6$$



Ex: Evaluate  $\int_2^4 \sqrt{x^2 + 2x + 1} dx$

No sub required  
Rewrite!

$$= \int_2^4 \sqrt{(x+1)^2} dx$$

Recall  $\sqrt{a^2} = |a|$

$$\sqrt{(-3)^2} = 3$$

$$\sqrt{(x+1)^2} = |x+1|$$

$$= x+1, \text{ for } 2 \leq x \leq 4$$

$$= \int_2^4 (x+1) dx$$

$$= \left[ \frac{x^2}{2} + x \right]_2^4$$

$$= \left( \frac{4^2}{2} + 4 \right) - \left( \frac{2^2}{2} + 2 \right)$$

$$= 8$$