

MATH 1101Y 2009 Quiz 10 (a)

Evaluate the indefinite integrals.

1. (1.5 pts)  $\int x^3 (x^4 + 6)^8 dx$

*Solution:* Let  $u = x^4 + 6$ ,  $du = 4x^3 dx$ .

$$\begin{aligned} & \int x^3 (x^4 + 6)^8 dx \\ &= \frac{1}{4} \int 4x^3 (x^4 + 6)^8 dx \\ &= \frac{1}{4} \int u^8 du = \frac{1}{4} \cdot \frac{u^9}{9} + C \\ &= \frac{(x^4 + 6)^9}{36} + C. \end{aligned}$$

□

2. (1.5 pts)  $\int \frac{\ln x}{x} dx$

*Solution:* Let  $u = \ln x$ .  $du = \frac{1}{x} dx$ .

$$\begin{aligned} & \int \frac{\ln x}{x} dx \\ &= \int u du = \frac{u^2}{2} + C \\ &= \frac{(\ln x)^2}{2} + C. \end{aligned}$$

□

3. (2 pts)  $\int \frac{x}{1+x^4} dx$

*Solution:* Let  $u = x^2$ .  $du = 2x dx$ .

$$\begin{aligned} & \int \frac{x}{1+x^4} dx \\ &= \frac{1}{2} \int \frac{2x}{1+x^4} dx \\ &= \frac{1}{2} \int \frac{1}{1+u^2} du \\ &= \frac{1}{2} \arctan(u) + C \\ &= \frac{1}{2} \arctan(x^2) + C. \end{aligned}$$

□