

Name: _____

Quiz 23, section 5.5

1. (2 pts) Evaluate $I = \int \frac{x^3}{1+x^8} dx$

deriv of x^4

SO $u = x^4$

$du = 4x^3 dx$

$x^3 dx = \frac{1}{4} du$

$$I = \int \frac{1}{1+u^2} \left(\frac{1}{4} du \right) = \frac{1}{4} \tan^{-1} u + C$$

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

2. (3 pts) Evaluate $I = \int \frac{x^4}{1+3x^5} dx$

$u = 1+3x^5$

$du = 15x^4 dx$

$x^4 dx = \frac{1}{15} du$

$$I = \int \frac{1}{u} \left(\frac{1}{15} du \right)$$

$$= \frac{1}{15} \ln|u| + C = \frac{1}{15} \ln|1+3x^5| + C$$

3. (2 pts) Evaluate $I = \int \frac{1}{e^x(1+e^{-x})^2} dx$

$\frac{1}{e^x} = e^{-x}$

$u = 1+e^{-x}$

$du = -e^{-x} dx$

$e^{-x} dx = -du$

$$I = \int \frac{1}{u^2} (-du) = \int -u^{-2} du$$

$$= \frac{1}{u} + C = \frac{1}{1+e^{-x}} + C$$

4. (3 pts) Evaluate $I = \int x^3(x^2+4)^{3/4} dx$

$u = x^2+4$

$du = 2x dx$

$x dx = \frac{1}{2} du$

$x^2 = u-4$

$$I = \int x^2 (x^2+4)^{3/4} x dx$$

$$= \int (u-4) u^{3/4} \frac{1}{2} du = \frac{1}{2} \int u^{7/4} - 4u^{3/4} du$$

$$= \frac{1}{2} \left(\frac{4}{11} u^{11/4} - \frac{16}{7} u^{7/4} \right) + C$$

$$= \frac{2}{11} (x^2+4)^{11/4} - \frac{8}{7} (x^2+4)^{7/4} + C$$