

Worksheet 3, Math 1B

Integration by Partial Fractions, Other Substitutions

Monday, January 30, 2012

1. Use the Weierstrass substitution to find the indefinite integral of $\sec(x)$. Use trigonometric identities to show that this expression is equivalent to the one derived in class.

2. Evaluate the following integrals:

(a) $\int \frac{x^3}{x^3 + 1} dx$

(b) $\int \frac{x^3 + 4}{x^2 + 4} dx$

(c) $\int \frac{1}{x\sqrt{x+1}} dx$

(d) $\int \frac{x^3}{\sqrt[3]{x^2+1}} dx$

3. The functions $y = e^{x^2}$ and $y = x^2 e^{x^2}$ don't have elementary antiderivatives, but $y = (2x^2 + 1)e^{x^2}$ does. Evaluate

$$\int (2x^2 + 1)e^{x^2} dx$$

4. Factor $x^4 + 1$ as a difference of squares by first adding and subtracting the same quantity. Use this factorization to evaluate

$$\int \frac{1}{x^4 + 1} dx$$