

## Solutions

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Each answer shows the steps, then the **result**.

### 2.1

- $\frac{1}{3} \tan^{-1} \frac{x}{3} + C$

### 2.2

- $\ln |x^3 + 1| + C$

### 3.1 A

- By parts:  $xe^x - \int e^x dx = xe^x - e^x + C$

### 3.2

- $u = 1 + x^2 \Rightarrow du = 2x dx$ , so  $x dx = \frac{1}{2} du$ ; limits  $x = 0 \rightarrow u = 1$ ,  $x = 2 \rightarrow u = 5$ ;  
 $\int_1^5 \frac{1}{2} \sqrt{u} du = \frac{1}{2} \left[ \frac{2}{3} u^{3/2} \right]_1^5 = \frac{1}{3} (5^{3/2} - 1) = \frac{1}{3} (11.180 - 1) = 3.39$

### 3.3

(a)

- $4 = A(x + 2) + Bx$ ;  $x = 0 \Rightarrow A = 2$ ;  $x = -2 \Rightarrow B = -2$ ;  $\frac{2}{x} - \frac{2}{x + 2}$

(b)

- $\int_1^3 \left( \frac{2}{x} - \frac{2}{x + 2} \right) dx = \left[ 2 \ln x - 2 \ln(x + 2) \right]_1^3 = 2 \ln \frac{x}{x + 2} \Big|_1^3 = 2 \left( \ln \frac{3}{5} - \ln \frac{1}{3} \right) = 2 \ln \frac{9}{5}$