



Lesson 7-4 Integration of Rational Functions Using Partial Fractions

1- Use a partial fractions decomposition to find $\int \frac{2x^2-5x+2}{x^3+x} dx$

- A- $= \ln|x| - \tan^{-1}x + c$
- B- $= 2\ln|x| - 5\tan^{-1}x + c$
- C- $= 2x - 5\tan^{-1}x + c$
- D- $= 2\ln|x| - \tan^{-1}x + c$

2- Use a partial fractions decomposition to find $\int \frac{x-5}{x^2-1} dx$

- A- $= 3\ln(|x+1|) - 2\ln(|x-1|) + c$
- B- $= 4\ln(|x+1|) - 2\ln(|x-1|) + c$
- C- $= -3\ln(|x+1|) + 2\ln(|x-1|) + c$
- D- $= 3\ln(|x+1|) + 2\ln(|x-1|) + c$

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3- Use a partial fractions decomposition to find $\int \frac{6x}{x^2-x-2} dx$

- A- $= 2\ln(|x+1|) - 4\ln(|x-2|) + c$
- B- $= 2\ln(|x-1|) + 4\ln(|x+2|) + c$
- C- $= 4\ln(|x+1|) + 2\ln(|x-2|) + c$
- D- $= 2\ln(|x+1|) + 4\ln(|x-2|) + c$

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4- Use a partial fractions decomposition to find $\int \frac{-x+5}{x^3-x^2-2x} dx$

- A- $= 0.5\ln(|x-2|) - 2\ln(|x+1|) - 2.5\ln(|x|) + c$
- B- $= 2.5\ln(|x-2|) + 2\ln(|x+1|) - 0.5\ln(|x|) + c$
- C- $= 0.5\ln(|x-2|) + 2\ln(|x+1|) - 2.5\ln(|x|) + c$
- D- $= 5\ln(|x-2|) + 2\ln(|x+1|) - 5\ln(|x|) + c$



5- Use a partial fractions decomposition to find $\int \frac{1}{x^3+4x} dx$

- A- $= \frac{-1}{8} \ln(x^2 + 4) + \frac{1}{4} \ln(|x|) + c$
 B- $= \frac{-1}{8} \ln(x^2 + 4) - \frac{1}{4} \ln(|x|) + c$
 C- $= \frac{1}{8} \ln(x^2 + 4) + \frac{1}{4} \ln(|x|) + c$
 D- $= \frac{1}{4} \ln(x^2 + 4) - \frac{1}{8} \ln(|x|) + c$

6- Use a partial fractions decomposition to find $\int \frac{4x^2-7x-17}{6x^2-11x-10} dx$

- A- $= \frac{5\ln(|3x+2|)}{9} - \frac{\ln(|x-5|)}{2} + \frac{2x}{3} + c$
 B- $= \frac{5\ln(|3x-2|)}{9} - \frac{\ln(|2x+5|)}{2} + \frac{2x}{3} + c$
 C- $= \frac{5\ln(|3x+2|)}{9} + \frac{\ln(|2x-5|)}{2} + \frac{2x}{3} + c$
 D- $= \frac{5\ln(|3x+2|)}{9} - \frac{\ln(|2x-5|)}{2} + \frac{2x}{3} + c$
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7- Use a partial fractions decomposition to find $\int \frac{x^3+x}{x^2-1} dx$

- A- $= \ln(|x+1|) + 2\ln(|x-1|) + x^2 + c$
 B- $= \ln(|x+1|) + \ln(|x-1|) + 0.5x^2 + c$
 C- $= \ln(|x+1|) + \ln(|x-1|) - 0.5x^2 + c$
 D- $= \ln(|x+1|) - 2\ln(|x-1|) + 0.5x^2 + c$

8- Use a partial fractions decomposition to find $\int \frac{x^3-4}{x^3+2x^2+2x} dx$

- A- $= 2\tan^{-1}(x+1) - 2\ln(|x|) + x + c$
 B- $= 2\tan^{-1}(x+1) + 2\ln(|x|) + x + c$
 C- $= 2\tan^{-1}(x+1) - 2\ln(|x|) - x + c$
 D- $= \tan^{-1}(x+1) - 2\ln(|x|) + x + c$



9- Use a partial fractions decomposition to find $\int \frac{4}{x^3 - 2x^2 + 4x} dx$

- A- $= \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{x-1}{\sqrt{3}}\right) + \ln(|x|) + \frac{1}{2} \ln(|x^2 - 2x + 4|) + c$
 B- $= \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{x-1}{\sqrt{3}}\right) - \ln(|x|) + \frac{1}{2} \ln(|x^2 - 2x + 4|) + c$
 C- $= \frac{1}{3} \tan^{-1}\left(\frac{\sqrt{3}x-1}{3}\right) + \ln(|x|) - \frac{1}{2} \ln(|x^2 - 2x + 4|) + c$
 D- $= \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{x-1}{\sqrt{3}}\right) + \ln(|x|) - \frac{1}{2} \ln(|x^2 - 2x + 4|) + c$

10- Use a partial fractions decomposition to find $\int \frac{2x^4 + 9x^2 + x - 4}{x^3 + 4x} dx$

- A- $= \ln(x^2 + 4) + \ln(|x|) + 2 \tan^{-1}(2x) + c$
 B- $= \ln(x^2 + 4) - \ln(|x|) + 2 \tan^{-1}(2x) + c$
 C- $= \ln(x^2 + 4) - \ln(|x|) + 0.5 \tan^{-1}(0.5x) + c$
 D- $= \ln(x^2 + 4) + \ln(|x|) + 0.5 \tan^{-1}(0.5x) + c$

11- Evaluate the integral $\int \frac{x^3 + x + 2}{x^2 + 2x - 8} dx$

- A- $= 2 \ln(|x - 2|) + 7 \ln(|x + 4|) + 0.5x^2 - 2x + c$
 B- $= 2 \ln(|x - 2|) + 11 \ln(|x + 4|) + 0.5x^2 - 2x + c$
 C- $= 2 \ln(|x - 2|) - 11 \ln(|x + 4|) + 0.5x^2 - 2x + c$
 D- $= 2 \ln(|x - 2|) + 11 \ln(|x + 4|) + 0.5x^2 - 2x + c$

12- Evaluate the integral $\int \frac{x^2 + 1}{x^2 - 5x - 6} dx$

- A- $= \frac{37 \ln(|x - 6|)}{7} - \frac{2 \ln(|x + 1|)}{7} + x + c$
 B- $= \frac{-37 \ln(|x - 6|)}{7} - \frac{2 \ln(|x + 1|)}{7} + x + c$
 C- $= \frac{37 \ln(|x - 6|)}{7} + \frac{2 \ln(|x + 1|)}{7} + x + c$
 D- $= \frac{37 \ln(|x - 6|)}{7} - \frac{5 \ln(|x + 1|)}{7} + x + c$



13- Evaluate the integral $\int \frac{1}{x^3-1} dx$

- A- $= \frac{-1}{\sqrt{3}} \tan^{-1}\left(\frac{2x-1}{\sqrt{3}}\right) + \frac{1}{3} \ln(|x-11|) + \frac{1}{6} \ln(|x^2+x+1|) + c$
- B- $= \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{2x-1}{\sqrt{3}}\right) - \frac{1}{3} \ln(|x-11|) - \frac{1}{6} \ln(|x^2+x+1|) + c$
- C- $= \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{2x-1}{\sqrt{3}}\right) + \frac{1}{3} \ln(|x-11|) - \frac{1}{6} \ln(|x^2+x+1|) + c$
- D- $= \frac{-1}{\sqrt{3}} \tan^{-1}\left(\frac{2x-1}{\sqrt{3}}\right) + \frac{1}{3} \ln(|x-11|) - \frac{1}{6} \ln(|x^2+x+1|) + c$

14- Evaluate the integral $\int \frac{4x^3-1}{x^4-x} dx$

- A- $= \ln(x^4 - x) + c$
- B- $= \ln(|x^4 - x|) + c$
- C- $= \ln(x^2 + x + 4) - \ln(|x - 1|) + c$
- D- $= \ln(x^2 + x + 4) + \ln(|x + 1|) + c$

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15- Evaluate the integral $\int \frac{4x-2}{16x^4-1} dx$

- A- $= -0.25 \ln(4x^2 + 1) + 0.5 \ln(|2x + 1|) + 0.5 \tan^{-1}(2x) + c$
- B- $= -4 \ln(4x^2 + 1) + 2 \ln(|2x + 1|) + 2 \tan^{-1}(2x) + c$
- C- $= -0.25 \ln(4x^2 + 1) + 0.5 \ln(|2x + 1|) + 0.5 \tan^{-1}(x) + c$
- D- $= 0.25 \ln(4x^2 + 1) - 0.5 \ln(|2x + 1|) + 0.5 \tan^{-1}(x) + c$

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16- Evaluate the integral $\int \frac{4x+4}{x^4+x^3+2x^2} dx$

- A- $= \ln(x^2 + 4) + \ln(|x|) - \frac{5}{\sqrt{7}} \tan^{-1}\left(\frac{2x+1}{\sqrt{7}}\right) + \frac{2}{\sqrt{x}} + c$
- B- $= -2 \ln(x^2 + 4) + \ln(|x|) - \frac{5}{\sqrt{7}} \tan^{-1}\left(\frac{2x+1}{\sqrt{7}}\right) - \frac{2}{\sqrt{x}} + c$
- C- $= \ln(x^2 + 4) + \ln(|x|) + \frac{5}{\sqrt{7}} \tan^{-1}\left(\frac{2x+1}{\sqrt{7}}\right) - \frac{2}{\sqrt{x}} + c$
- D- $= \ln(x^2 + 4) + \ln(|x|) - \frac{5}{\sqrt{7}} \tan^{-1}\left(\frac{2x+1}{\sqrt{7}}\right) - \frac{2}{\sqrt{x}} + c$