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

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

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

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

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

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

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

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- $= \frac{5ln(|3x+2|)}{9} - \frac{ln(|x-5|)}{2} + \frac{2x}{3} + c$

B- $= \frac{5ln(|3x-2|)}{9} - \frac{ln(|2x+5|)}{2} + \frac{2x}{3} + c$

C- $= \frac{5ln(|3x+2|)}{9} + \frac{ln(|2x-5|)}{2} + \frac{2x}{3} + c$

D- $= \frac{5ln(|3x+2|)}{9} - \frac{ln(|2x-5|)}{2} + \frac{2x}{3} + c$

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

A- $= ln(|x+1|) + 2ln(|x-1|) + x^2 + c$

B- $= ln(|x+1|) + ln(|x-1|) + 0.5x^2 + c$

C- $= ln(|x+1|) + ln(|x-1|) - 0.5x^2 + c$

D- $= ln(|x+1|) - 2ln(|x-1|) + 0.5x^2 + c$

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

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

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

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

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

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

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

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

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

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

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

A- $= ln(x^2+4) + ln(|x|) + 2tan^{-1}(2x) + c$

B- $= ln(x^2+4) - ln(|x|) + 2tan^{-1}(2x) + c$

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

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

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

A- $= 2ln(|x-2|) + 7ln(|x+4|) + 0.5x^2 - 2x + c$

B- $= 2ln(|x-2|) + 11ln(|x+4|) + 0.5x^2 - 2x + c$

C- $= 2ln(|x-2|) - 11ln(|x+4|) + 0.5x^2 - 2x + c$

D- $= 2ln(|x-2|) + 11ln(|x-4|) + 0.5x^2 - 2x + c$

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

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

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

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

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

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

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

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

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

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

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- $= ln(x^2+x+4) + ln(|x+1|) + c$

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

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

B- $= -4ln(4x^2+1) + 2ln(|2x+1|) + 2tan^{-1}(2x) + c$

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

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

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

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

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

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

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