Join the Signature Track Learn More! ×

Homework 24

The **due date** for this homework is **Tue 7 May 2013 12:00 AM EDT**.

Question 1

$$\int \frac{5+x}{x^2+x-6}\,dx =$$

- $\frac{7}{5}\ln\left|\frac{x-2}{x+3}\right| + C$
- $\ln|x^2-x+6| + \frac{11}{\sqrt{23}}\arctan\frac{2x-1}{\sqrt{23}} + C$
- $\frac{2}{5}\ln|x-2| - \frac{7}{5}\ln|x+3| + C$
- $\ln|x-2| - \ln|x+3| + C$
- $\frac{7}{5}\ln|x-2| - \frac{2}{5}\ln|x+3| + C$
- $\frac{1}{5}\ln\left|\frac{x+3}{x-2}\right| + C$

Question 2

$$\int \frac{2x+3}{6x^2+5x+1}\,dx =$$

- $\frac{7}{3}\ln|2x+1| - 4\ln|3x+1| + C$
- $7\ln|3x+1| - 2\ln|2x+1| + C$
- $\frac{7}{3}\ln|2x+1| - 2\ln|3x+1| + C$

- $7 \ln|3x+1| - \frac{2}{3} \ln|2x+1| + C$
- $\frac{7}{3} \ln|3x+1| - 2\ln|2x+1| + C$
- $\frac{7}{3} \ln|3x+1| - \frac{2}{3} \ln|2x+1| + C$

Question 3

$$\int \frac{x^3+10x^2+33x+36}{x^2+4x+3}\,dx =$$

- $\frac{1}{2}x^2 + 6x + 3\ln|x+1| + 3\ln|x+3| + C$
- $x^2 + 6\ln|x+1| + C$
- $\frac{8}{9} \ln|x+1| + \frac{4}{9} \ln|x+3| + C$
- $\ln|x+1| - \ln|x+3| + C$
- $\frac{1}{2}x^2 + 6x + 6\ln|x+1| + C$
- $\frac{1}{2}x^2 + \ln|x^2+4x+3| + C$

Question 4

$$\int \frac{x^2-x+5}{(x-2)(x-1)(x+3)}\,dx =$$

- $\frac{1}{4} \ln\left|\frac{x^2+x-6}{x-1}\right| + C$
- $\frac{7}{5} \ln|x-2| - \ln|x-1| + \frac{1}{20} \ln|x+3| + C$
- $-\frac{1}{4} \ln\left|\frac{x^2+x-6}{x-1}\right| + C$

- $\dfrac{7}{5}\ln|x-2| - \dfrac{5}{4}\ln|x-1| + \dfrac{17}{20}\ln|x+3| + C$
- $\dfrac{2}{5}\ln|x-2| - \dfrac{3}{4}\ln|x-1| + C$
- $\dfrac{37}{43}\ln|(x-2)(x-1)(x+3)| + C$

Question 5

$$\int \frac{2x-1}{x^3-x}\,dx =$$

- $\ln\left|\dfrac{x^2(x-1)}{(x+1)^3}\right| + C$
- $\ln|x| - \dfrac{1}{2}\ln|x-2| - \dfrac{1}{2}\ln|x+1| + C$
- $\ln\left|\dfrac{x+1}{x(x-1)}\right| + C$
- $\ln\left|\dfrac{(x+1)^3}{x^2(x-1)}\right| + C$
- $\ln|x| + \dfrac{1}{2}\ln|x-1| - \dfrac{3}{2}\ln|x+1| + C$
- $\ln\left|\dfrac{x(x-1)}{x+1}\right| + C$

Question 6

$$\int \frac{x^2-3}{x^2-4}\,dx =$$

- $x + \dfrac{1}{4}\ln|x^2-4| + C$
- $x + \dfrac{1}{2}\ln|x-2| - \dfrac{1}{4}\ln|x+2| + C$

- $x - \dfrac{3}{4}\ln\left|\dfrac{x-2}{x+2}\right| + C$
- $\dfrac{3}{4}\ln\left|\dfrac{x+2}{x-2}\right| + C$
- $x - \dfrac{1}{x} - 4x + C$
- $x + \dfrac{1}{4}\ln\left|\dfrac{x-2}{x+2}\right| + C$

Question 7

$$\int \frac{x+2}{(x-1)^2}\,dx =$$

Hint: remember from the Lecture that we can deal with multiple roots in the denominator by using a partial fraction decomposition of the form

$$\frac{P(x)}{(x-r)^n} = \frac{A_1}{x-r} + \frac{A_2}{(x-r)^2} + \cdots + \frac{A_n}{(x-r)^n}$$

Clearing denominators results in the equation:

$$P(x) = A_1(x-r)^{n-1} + A_2(x-r)^{n-2} + \cdots + A_n \qquad (*)$$

Notice that, in this case, the direct technique for finding the coefficients $A_1, \ldots, A_n$ —substituting $x = r$ in $(*)$— does not quite work: it only gives you the last coefficient, A_n. In order to find the other coefficients, $A_1, \ldots, A_{n-1}$, you can revert to equating the coefficients of each power of x on both sides of the equation $(*)$.

- $3\ln|x+1| + C$
- $\ln|x+1| - 3\ln|x+1|^2 + C$
- $\ln|x-1| + \dfrac{3}{x-1} + C$
- $\ln|x-1| - \dfrac{3}{x-1} + C$

- $\ln|x+1| + 3\ln|x+1|^2 + C$
- $\ln|x-1| + \dfrac{2}{x-1} + C$

Question 8

$$\int \frac{dx}{x^2 - 4x + 8} =$$

Hint: complete the square in the denominator and perform a judicious substitution to get an integral of the form $\displaystyle\int \frac{du}{1+u^2}$.

- $\dfrac{1}{2}\arctan\left(1 + \dfrac{x}{2}\right) + C$
- $\dfrac{1}{4}\arctan\dfrac{x-2}{2} + C$
- $\dfrac{1}{2}\arctan\dfrac{x-2}{2} + C$
- $\dfrac{1}{2}\arctan\dfrac{x+2}{3} + C$
- $\dfrac{1}{4}\arctan\left(1 + \dfrac{x}{2}\right) + C$
- $\dfrac{1}{4}\arctan\dfrac{x+2}{3} + C$

- [ ] In accordance with the Honor Code, I certify that my answers here are my own work.

Submit Answers | Save Answers