

This print-out should have 10 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

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**001 10.0 points**

Rewrite the expression

$$f(x) = \frac{2x}{x^2 - 3x + 2}$$

using partial fractions.

- ~~1.~~  $f(x) = \frac{2}{x-2} + \frac{1}{x-1}$
- ~~2.~~  $f(x) = \frac{2}{x-2} + \frac{4}{x+1}$
- 3.**  $f(x) = \frac{4}{x-2} - \frac{2}{x-1}$
- ~~4.~~  $f(x) = \frac{2}{x-2} - \frac{1}{x-1}$
- ~~5.~~  $f(x) = \frac{2}{x-2} - \frac{4}{x+1}$

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**002 10.0 points**

Rewrite the expression

$$f(x) = \frac{28}{x^2 + x - 12}$$

using partial fractions.

- 1.**  $f(x) = \frac{4}{x-3} - \frac{4}{x+4}$
- ~~2.~~  $f(x) = \frac{4}{x-3} + \frac{4}{x+4}$
- ~~3.~~  $f(x) = \frac{5}{x-3} + \frac{3}{x+4}$
- ~~4.~~  $f(x) = \frac{5}{x-3} - \frac{3}{x+4}$
- ~~5.~~ None of these

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**003 10.0 points**

Rewrite the expression

$$f(x) = \frac{3x - 2}{x^2(x - 3)}$$

using partial fractions.

- 1.**  $f(x) = -\frac{7}{9x} + \frac{2}{3x^2} + \frac{7}{9(x-3)}$
- ~~2.~~  $f(x) = \frac{2}{3x} - \frac{7}{9x^2} - \frac{7}{9(x-3)}$
- ~~3.~~  $f(x) = \frac{2}{x^2} - \frac{7}{x-3}$
- ~~4.~~  $f(x) = -\frac{2}{x^2} + \frac{7}{x-3}$
- ~~5.~~  $f(x) = \frac{7}{x} - \frac{2}{3x^2} + \frac{7}{9(x-3)}$

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**004 10.0 points**

Rewrite the expression

$$f(x) = \frac{9x}{(x-1)(x^2+x+1)}$$

using partial fractions.

- 1.**  $f(x) = \frac{3}{x-1} + \frac{3-3x}{x^2+x+1}$
- ~~2.~~  $f(x) = \frac{3}{x-1} + \frac{6x+9}{x^2+x+1}$
- ~~3.~~  $f(x) = -\frac{6}{x-1} + \frac{6-3x}{x^2+x+1}$
- ~~4.~~  $f(x) = \frac{6}{x-1} + \frac{6-3x}{x^2+x+1}$
- ~~5.~~  $f(x) = -\frac{3}{x-1} - \frac{3+3x}{x^2+x+1}$
- ~~6.~~  $f(x) = -\frac{3}{x-1} + \frac{6x+9}{x^2+x+1}$

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**005 10.0 points**

In the partial fractions decomposition of the expression

$$f(x) = \frac{x^3 + 2x - 3}{x^2 - x - 2},$$

find the term having denominator  $x - 2$ .

~~1.~~  $-\frac{3}{x-2}$

**2.**  $\frac{3}{x-2}$

~~3.~~  $-\frac{2}{x-2}$

~~4.~~  $\frac{1}{x-2}$

~~5.~~  $\frac{2}{x-2}$

~~6.~~  $-\frac{1}{x-2}$

**006 10.0 points**

Determine the indefinite integral

$$I = \int \frac{x+8}{(x+3)(x-2)} dx.$$

~~1.~~  $I = \ln\left(\frac{(x-2)^2}{x+3}\right) + C$

~~2.~~  $I = \ln\left(\frac{x+3}{(x-2)^2}\right) + C$

**3.**  $I = \ln\left(\frac{(x-2)^2}{|x+3|}\right) + C$

~~4.~~  $I = \ln\left(\left|\frac{x-2}{x+3}\right|\right) + C$

~~5.~~  $I = \ln\left(\frac{|x+3|}{(x-2)^2}\right) + C$

**007 10.0 points**

Evaluate the integral

$$I = \int_0^1 \frac{4}{(x+1)(x^2+1)} dx.$$

~~1.~~  $I = 2\left(\frac{\pi}{2} - \ln(2)\right)$

**2.**  $I = \ln(2) + \frac{\pi}{2}$

~~3.~~  $I = 2\left(\ln(8) - \frac{\pi}{2}\right)$

~~4.~~  $I = 2\left(\ln(2) + \frac{\pi}{2}\right)$

~~5.~~  $I = \frac{\pi}{2} - \ln(2)$

~~6.~~  $I = \ln(8) - \frac{\pi}{2}$

**008 10.0 points**

Evaluate the integral

$$I = \int_3^5 \frac{1}{(x-2)(6-x)} dx.$$

**1.**  $I = \frac{1}{4} \ln(9)$

~~2.~~  $I = \ln(9)$

~~3.~~  $I = \frac{1}{4} \ln\left(\frac{15}{7}\right)$

~~4.~~  $I = \ln\left(\frac{15}{7}\right)$

~~5.~~  $I = \frac{1}{3} \ln(9)$

~~6.~~  $I = \frac{1}{3} \ln\left(\frac{15}{7}\right)$

**009 10.0 points**

Evaluate the definite integral

$$I = \int_0^1 \frac{2x^2 - 3x + 4}{x^2 - x - 2} dx.$$

1.  $I = 2 - 4 \ln 2$

2.  $I = 3 + 5 \ln 2$

3.  $I = 2 - 5 \ln 2$

4.  $I = 2 + 4 \ln 2$

5.  $I = 3 + 4 \ln 2$

6.  $I = 3 - 5 \ln 2$

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**010 10.0 points**

Find the unique function  $y$  satisfying the equations

$$\frac{dy}{dx} = \frac{6}{(x-2)(7-x)}, \quad y(3) = 0.$$

1.  $y = \frac{6}{5} \left( \ln \left( \left| \frac{x-2}{7-x} \right| \right) + \ln(4) \right)$

2.  $y = \frac{6}{5} \left( \ln \left( \left| \frac{7-x}{x-2} \right| \right) - \ln(4) \right)$

3.  $y = 6 \left( \ln \left( \left| \frac{7-x}{x-2} \right| \right) - \ln(4) \right)$

4.  $y = \frac{1}{5} \left( \ln \left( \left| \frac{x-2}{7-x} \right| \right) + \ln(4) \right)$

5.  $y = 6 \left( \ln \left( \left| \frac{x-2}{7-x} \right| \right) + \ln(4) \right)$