**Instructions:** This is your third quiz. Choose the *single best answer* from the list of options. Please fill in

- Your User ID

- Your Name

- Your Section

- Your UIN number.

The User ID is *the most important identifier* as this is how Compass identifies students (not by first and last name, which are often not unique). If you don't include your user ID your score will probably not be recorded correctly.

**Double your money back guarantee!** If your answer is scored wrong and you can demonstrate that the integral can be done successfully using your method you get a two point bonus.

**Note:** In all cases the integral contains an arbitrary constant of integration, which I did not bother writing.

**Problem 1:**
$$I = \int \frac{x}{(x+1)(x^2+1)} dx$$
what would be the **form** of the partial fractions identity

**a** $\frac{x}{(x+1)(x^2+1)} = \frac{A}{x+1} + \frac{B}{(x^2+1)} + \frac{C}{(x^2+1)^2}$

**b** $\frac{x}{(x+1)(x^2+1)} = \frac{A}{x+1} + \frac{B}{1} + \frac{C}{x^2}$

**c** $\frac{x}{(x+1)(x^2+1)} = \frac{A}{x+1} + \frac{Bx+C}{(x^2+1)}$

**d** $\frac{x}{(x+1)(x^2+1)} = \frac{Ax+B}{x+1} + \frac{C}{(x^2+1)}$

**e** $\frac{x}{(x+1)(x^2+1)} = \frac{A}{x+1} + \frac{B}{x^2} + \frac{C}{(x^2+1)^2}$

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**Problem 2:** Find the appropriate values of $A, B, C$ in the above example (using the constants $A, B, C$ as they appear above

**a** $A = -\frac{1}{2}, B = \frac{1}{2}, C = \frac{1}{2}$

**b** $A = -\frac{1}{2}, B = \frac{1}{3}, C = \frac{1}{6}$

**c** $A = -\frac{1}{2}, B = \frac{1}{4}, C = \frac{1}{3}$

**d** $A = \frac{1}{3}, B = -\frac{1}{2}, C = -\frac{1}{6}$

**e** $A = \frac{1}{6}, B = -\frac{1}{3}, C = \frac{1}{2}$

**Problem 3:** Compute the following integral

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

**a** $I = \frac{1}{3}\ln(x^2+1) - \frac{1}{6}\log(1+x) + \frac{1}{2}\arctan(x)$

**b** $I = \frac{1}{6}\ln(x^2+1) - \frac{1}{3}\log(1+x) - \frac{1}{2}\arctan(x)$

**c** $I = \frac{1}{4}\ln(x^2+1) - \frac{1}{2}\log(1+x) + \frac{1}{2}\arctan(x)$

**d** $I = \frac{1}{3}\ln(x^2+1) - \frac{1}{2}\log(1+x) + \frac{1}{3}\arctan(x)$

**e** $I = \frac{1}{3}\ln(x^2+1) - \frac{1}{2}\log(1+x) + \frac{1}{6}\arctan(x)$

**Problem 4:** Use synthetic division to write the rational function

$$\frac{x^3}{(x^2 - 1)}$$

in the form

$$Ax + B + \frac{Cx + D}{x^2 - 1}$$

**a** $\frac{x^3}{(x^2-1)} = 1 + \frac{1}{x^2-1)}$

**b** $\frac{x^3}{(x^2-1)} = x + \frac{1}{x^2-1)}$

**c** $\frac{x^3}{(x^2-1)} = 1 + \frac{x}{x^2-1)}$

**d** $\frac{x^3}{(x^2-1)} = x + \frac{x}{x^2-1)}$

**e** $\frac{x^3}{(x^2-1)} = x - \frac{x}{x^2-1)}$

**Problem 5:** Compute the following integral

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

**a** $I = \frac{x}{2} + \frac{1}{2} \ln|x - 1| + \frac{1}{2} \ln|x + 1|$

**b** $I = \frac{x}{2} + \frac{1}{2} \ln|x - 1| - \frac{1}{2} \ln|x + 1|$

**c** $I = \frac{x^2}{3} + \frac{1}{2} \arctan(x)$

**d** $I = \frac{x^2}{2} + \frac{1}{2} \ln|x - 1| + \frac{1}{2} \ln|x + 1|$

**e** $I = -\frac{x^2}{2} + \frac{1}{6} \ln|x - 1| + \frac{1}{3} \ln|x + 1|$