B1.

MATH 1700: Test #5 (Fall 2008)
Solutions

[7] **1.** Write the general form (in terms of unknown coefficients) of the partial fraction decomposition (expansion) of the following expression. DO NOT SOLVE FOR THE COEFFICIENTS.

$$\frac{1}{(x^2-2x)(x^2+4)^2} =$$

Solution: $\frac{1}{(x^2-2x)(x^2+4)^2} = \frac{1}{x(x-2)(x^2+4)^2} = \frac{A}{x} + \frac{B}{x-2} + \frac{C_1x+D_1}{x^2+4} + \frac{C_2x+D_2}{(x^2+4)^2}$

[9] **2.** Evaluate $\int_2^\infty \frac{1}{x^{1.001}}\,dx$.

Solution.

$$\int_2^\infty \frac{1}{x^{1.001}}\,dx = \lim_{t\to\infty}\int_2^t \frac{1}{x^{1.001}}\,dx = \lim_{t\to\infty}\left(\frac{x^{-0.001}}{-0.001}\right)\Bigg|_2^t = -\frac{1}{0.001}\lim_{t\to\infty}\left(\frac{1}{t^{0.001}} - \frac{1}{2^{0.001}}\right) = \frac{1}{0.001}\,\frac{1}{2^{0.001}}.$$

[8] **3.** Set up but DO NOT EVALUATE the integral for the length of the part of the curve $y=-x^2+4$ not below the x-axis.

Solution. The graph of $y=-x^2+4$ is not below the x-axis for x in the interval $[-2.2]$. So the arc length we want is

$$\int_{-2}^{2}\sqrt{1+(y')^2}\,dx = \int_{-2}^{2}\sqrt{1+(-2x)^2}\,dx .$$