

MA126 Quiz 3

Name: KEY

1) (8 pts) Evaluate the definite integral

$$\int_0^{\pi} \sin^2 x \, dx$$

use the identity: $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$

$$\int_0^{\pi} \sin^2 x = \frac{1}{2} \int_0^{\pi} 1 \, dx - \frac{1}{2} \int_0^{\pi} \cos 2x \, dx \quad \text{Let } u = 2x \quad \frac{du}{dx} = 2 \quad dx = \frac{du}{2}$$

$$\left(\frac{1}{2} x \Big|_0^{\pi} = \frac{\pi}{2} \right) \left(-\frac{1}{4} \int_0^{2\pi} \cos u \, du = -\frac{1}{4} (\sin u \Big|_0^{2\pi}) = 0 \right)$$

Answer: $\pi/2$

2) (8 pts) Write out the form of the partial fraction expansion of the following function. **DO NOT** solve for the coefficients.

$$\frac{2}{x^2 + 3x - 4}$$

$$= \frac{2}{(x+4)(x-1)} = \frac{A}{x+4} + \frac{B}{x-1} \quad \text{case I}$$

(OVER)

3) (9 pts) Write out the form of the partial fraction expansion of the following function. **DO NOT** solve for the coefficients.

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

$$\frac{x^2}{(x-1)^2(x^2+x+1)} = \frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{Cx+D}{x^2+x+1}$$

↑

$$b^2-4ac = 1^2-4 \cdot 1 \cdot 1 = -3 < 0$$

\Rightarrow Irreducible