

Quiz 5 - In Class

SHOW ALL WORK!!! Unsup

**Problem 1** [2 pts] Give the general partial fraction decomposition for the following function. DO NOT SOLVE FOR THE CONSTANTS!

$$f(x) = \frac{4x^3 - 7}{x^6 - x^2}$$

$$\frac{4x^3 - 7}{x^2(x^4 - 1)} = \frac{4x^3 - 7}{x^2(x^2 - 1)(x^2 + 1)} = \frac{4x^3 - 7}{x^2(x+1)(x-1)(x^2 + 1)}$$

$$\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+1} + \frac{D}{x-1} + \frac{Ex + F}{x^2 + 1}$$

**Problem 2** [4 pts]

Given that  $\frac{2x + 36}{(2x - 1)(x^2 + 9)} = \frac{4}{2x - 1} - \frac{2x}{x^2 + 9}$ , evaluate:

$$\int_3^{\infty} \frac{2x + 36}{(2x - 1)(x^2 + 9)} dx$$

$$\lim_{b \rightarrow \infty} \int_3^b \left( \frac{4}{2x-1} - \frac{2x}{x^2+9} \right) dx$$

$$u = 2x - 1$$

$$du = 2$$

$$\frac{du}{x^2 + a^2} = \frac{1}{a} \tan^{-1} \frac{x}{a}$$

$$\frac{1}{3} \tan^{-1} \frac{x}{3}$$

$$\frac{1}{2} \cdot 4 \int_3^b \frac{du}{u} - \int_3^b \frac{2x}{x^2+9} dx$$

$$u = x^2 + 9$$

$$du = 2x dx$$

$$2 \ln|u| - \frac{1}{3} \tan^{-1} \frac{x}{3}$$

$$2 \ln(2x-1) - \frac{1}{3} \tan^{-1} \frac{x}{3} \Big|_3^b$$

(-3)

$$2 \ln(2b-1) - \frac{1}{3} \left( \frac{\pi}{2} \right) - \left( 2 \ln(5) - \frac{1}{3} \tan^{-1}(1) \right)$$

$\infty$   
DNE