

Math 199 CD3 Merit Worksheet 10: Midterm Review

February 25, 2022

1 Partial Fraction

How many constants do you need to partial fraction these function?

1.

$$\frac{(x-2)^2 + 6}{(x-3)((x-4)^2 + 4)(x-5)((3x^2)^4 + 5)}$$

2.

$$\frac{(3x^2 - 2)^2 + 6}{(x^2 - 3)((x-4)^2 + 4)^2(x-5)^4((3x^2)^4 + 5)}$$

3.

$$\frac{(3x^2 - 2)^2 + 6}{(4x^2 - 3)((9x - 4)^2 + 4)(x-5)((3x^2)^4 + 5)^2}$$

4.

$$\int_2^4 \frac{3x^2 + 1}{(x+1)(x-5)^2} dx$$

5.

$$\int \frac{4x - 11}{x^3 - 9x^2} dx$$

2 Improper Integral

Determine if these integral converge or diverge. Sometimes you need to calculate sometimes you can just use comparison test. Try to practice recognizing the pattern

(a)

$$\int_0^{\infty} (1+2x)e^{-x} dx$$

(b)

$$\int_2^{\infty} \frac{9}{(1-3x)^4} dx$$

(c)

$$\int_{-\infty}^0 \frac{e^{1/x}}{x^2} dx$$

(d)

$$\int_3^{\infty} \frac{x^2}{x^3-1} dx$$

(e)

$$\int_3^{\infty} \frac{x^2+1}{x^3(\cos^2(x)+1)} dx$$

3 Arc Length

Determine the arclength. Try to do the integral too just for practice.

(a) $y = (8x + 2)^{3/2}$, for $11^{3/2} < y < 27^{3/2}$

(b) $x = 2 + (y - 1)^2$, $2 \leq y \leq 5$

(c) $y = (3x + 2)^2$

4 Surface Area

(a) Rotating $y = 4 + 3x^2$, $1 \leq x \leq 2$ about the y -axis

(b) Rotating $y = \sin(2x)$, $0 \leq x \leq \frac{\pi}{8}$ about the x -axis

(c) Do the first problem changing the axis you rotate

5 Other Miscellaneous Areas

Anything from the previous worksheets can be fair game. Those are trig sub, integration by parts, Simpson's rule, etc. So please also take a look at those