

Name:

Soutias

Section: 11 12 13

1. Find  $\int \frac{x-3}{(x-4)(x-5)} dx$

$$\frac{x-3}{(x-4)(x-5)} = \frac{A}{x-4} + \frac{B}{x-5} \quad \text{clear fractions}$$

$$x-3 = A(x-5) + B(x-4)$$

$$x=5: \quad 2 = B(1) \Rightarrow B = 2$$

$$x=4: \quad 1 = A(-1) \Rightarrow A = -1$$

$$\begin{aligned} \int \frac{x-3}{(x-4)(x-5)} dx &= \int \frac{-1}{x-4} + \frac{2}{x-5} dx \\ &= -\ln|x-4| + 2\ln|x-5| + C \end{aligned}$$

2. Determine how large  $n$  should be so that  $T_n$  is within  $10^{-5}$  units of  $\int_1^2 x^{2/3} dx$ . You do not have to simplify your answer.

$$f(x) = x^{2/3}$$

$$f'(x) = \frac{2}{3} x^{-1/3}$$

$$f''(x) = -\frac{2}{9} x^{-4/3}$$

increasing function  
largest in magnitude at  $x=1$

$$|f''(x)| \leq \left| -\frac{2}{9} \cdot 1^{-4/3} \right| = \frac{2}{9}$$

we may  
use  $K = 2/9$

want:

$$\frac{K(b-a)^3}{12 \cdot n^2} < 10^{-5}$$

$$\frac{2/9(2-1)^3}{12 \cdot n^2} < 10^{-5}$$

solve for  $n$

$$\frac{2/9}{12} \cdot 10^5 < n^2$$

$$\Rightarrow \sqrt{\frac{2 \cdot 10^5}{9 \cdot 12}} < n$$