

Answer all questions and show your work. Unsupported answers may receive *no credit*. You may not use a calculator on this quiz. Allow 15 minutes for the quiz.

Name: \_\_\_\_\_ Section: \_\_\_\_\_

1. (a) (5 points) Find the integral  $\int \frac{x^2 - 3x + 1}{x^2 - 3x} dx$

**Solution:** First  $\frac{x^2 - 3x + 1}{x^2 - 3x} = 1 + \frac{1}{x(3-x)}$ . Then

$$\frac{1}{x(3-x)} = \frac{A}{x} + \frac{B}{3-x}$$

$$1 = A(3-x) + Bx$$

$$1 = A(3)$$

$$1 = B(3)$$

So  $A = B = \frac{1}{3}$ .

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

- (b) (5 points) Use the trapezoid rule and Simpson's rule to estimate the integral  $\int_0^2 3^x dx$ . For both use two steps.

**Solution:** The trapezoid rule gives

$$T_2 = \frac{1}{2}(3^0 + 2 * 3^1 + 3^2) = \frac{1 + 6 + 9}{2}$$

Simpson's rule gives

$$S_2 = \frac{1}{3}(3^0 + 4 * 3^1 + 3^2) = \frac{1 + 12 + 9}{3}$$