

**DO NOT TURN OVER UNTIL
INSTRUCTED TO DO SO.**

NO CALCULATORS PERMITTED.

EXAM TIME IS 60 MINUTES.

THE EXAM CONSISTS OF 5 QUESTIONS.

Your name: _____

Your SID: _____

Your Section and GSI: _____

Question 1	/ 20
Question 2	/ 20
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Question 5	/ 20
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Total	/ 100

1. (a) Prove

$$\log_b(st) = \log_b(s) + \log_b(t)$$

(b) Solve

$$\ln(x) + \ln(x - 1) = 1$$

2. Sketch the graph of the following rational function

$$f(x) = \frac{x^2 - 1}{x^4 - 16}$$

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3. Evaluate the following expressions

(a) $\log_{81}(27)$

(b) $81^{-\frac{3}{4}}$

(c) $e^{2\ln(3)+\ln(5)}$

(d) $area\left(\frac{1}{x}, 1, e^{\frac{1}{2}}\right)$

4. (a) Write down an equation for a circle around $(1, 2)$ with radius 3
- (b) Write down an equation for the ellipse obtained from (a) by stretching the coordinate system by a factor of 2 horizontally and a factor of 3 vertically
- (c) What are the area and coordinates of the center of the ellipse from (b)

5. You deposit \$50 in a bank account which promises an annual interest rate of 5%.
- (a) Write an expression for the amount of money in the account after t years have passed, assuming that the bank compounds interest monthly.
 - (b) Write an expression for the amount of money in the account after t years have passed, assuming that the bank compounds interest continuously.
 - (c) If interest is compounded continuously, how long will it take before you have \$200?

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