

MIDTERM EXAM 1 (PRACTICE)

This is the (practice) midterm exam for Math 16B, Winter 2009. Please write your name clearly at the top of the exam. The exam has 100 points, and you have 50 minutes to complete this exam. You may not use any notes or books, nor any calculating or computing devices. Please give *as much justification as you can* for all of your solutions.

1. (15 points) Solve each equation for x .

(a) $2 \ln x = 3 \ln 2$.

(b) $\frac{2}{1+5e^{-1/4x}} = 1$.

(c) $2^x e^x = 3$.

2. (25 points) Suppose some scientists begin observing a frog pond. After two years, there are 27 frogs, and after 3 years there are 81 frogs. If the frog population is growing exponentially, how many frogs were there initially?

3. (15 points) Find the derivative of each function.

(a) $f(x) = (x^2 + x)^{\sqrt{x}}$.

(b) $g(x) = (e^{x^2})^{\ln x^2}$.

4. (20 points) Find a function f that satisfies $f''(t) = t^{-3/2}$, $f'(0) = 6$ and $f(1) = 2$.

5. (25 points) Find each integral.

(a) $\int \frac{e^{3x}}{2} dx$

(b) $\int \frac{x}{\sqrt{1+2x^2}} dx$

(c) $\int \frac{1}{x \ln x} dx$