

## MAT 125 Fall 2006 Practice Midterm

- Let  $f(x) = x + \frac{1}{x}$ 
  - What is  $f \circ f(x)$ ?
  - What is the domain of  $f \circ f(x)$ ?
- A package of spinach in New York City has 100 E Coli bacteria, and the number of bacteria in the spinach triples every hour.
  - Give a formula  $E(t)$  for the number of bacteria in the spinach after  $t$  hours.
  - How many bacteria are present after 4 hours?
- Let  $f(x) = 4 - x$  and let  $g(x) = e^x$ .
  - What is  $f \circ g(x)$ ?
  - What is the inverse function of  $f \circ g(x)$ ?
  - What is the domain of the inverse function?
  - What is the range of the inverse function?
- Suppose  $f(x)$  and  $g(x)$  are continuous functions,  $f(1) = 4$ , and
$$\lim_{x \rightarrow 1} [3f(x) - 2g(x)] = 8$$
What is  $g(1)$ ?
- Let  $g(x)$  be a function such that
$$2x \leq g(x) \leq \cos(2\pi x) + 1$$
for every  $x$ . What is  $\lim_{x \rightarrow 1} g(x)$ ?
- Suppose  $h(x)$  is continuous on the interval  $[1, 2]$ ,  $h(1) = 2$  and  $h(2) = 17$ . Is there a number  $c$  such that  $h(c) = 12$ ? Explain why or why not.