

Math 10A.
Midterm Exam 1
October 25, 2012
Version A

Instructions:

1. You may use one page of notes, but you may not use any books or other assistance during this exam.
2. Write your *Name*, *PID*, and *Section* (for example A02) on the front of your Blue Book.
3. Write the *Version* of your exam on the front of your Blue Book.
4. Write your solutions clearly in your Blue Book
 - (a) Carefully indicate the number and letter of each question and each question part.
 - (b) Present your answers in the same order as they appear on the exam.
 - (c) Start each question on a new page (separate parts of the same question can be on the same page).
5. You may leave your answers in symbolic form, for example $\sqrt{42}$ or $\ln(6)$.
6. Show all of your work; no credit will be given for unsupported answers.
7. Write your solutions clearly and legibly; no credit will be given for illegible solutions.

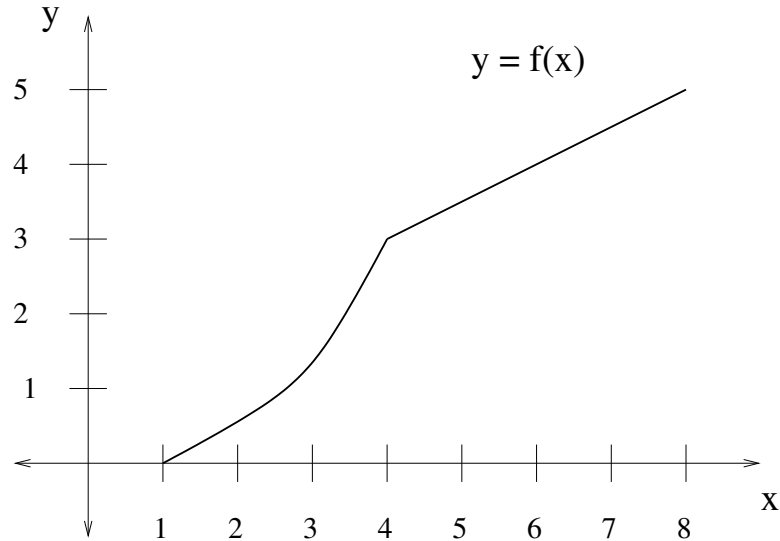
Problems:

1. Evaluate the given limit.

(a) (3 points) $\lim_{x \rightarrow \infty} \frac{2 + e^x}{3 + 4e^x}$

(b) (3 points) $\lim_{x \rightarrow -\infty} \frac{2 + e^x}{3 + 4e^x}$

2. Let f be the function whose graph appears below; the domain of f is the interval $[1, 8]$. Let $g(x) = -f(x + 2) + 4$.



- (a) (2 points) What is $f^{-1}(4)$?
- (b) (3 points) Carefully sketch the graph of g .
- (c) (2 points) What is the domain of g ?
- (d) (2 points) What is the range of g ?
3. Suppose a colony of bacteria grows exponentially. It starts with 150 cells and triples in size every six hours.
- (a) (4 points) Find a function that models the population growth of this colony of bacteria.
- (b) (1 point) How many cells will be in the colony after nine hours? (You need not calculate your answer numerically.)
4. A rock is thrown upward from the ground, and its position after t seconds is given by the formula $s(t) = -t^2 + 16t$. The position s is measured in feet and $t = 0$ is the time when the rock was thrown into the air.
- (a) (1 points) When will the rock hit the ground?
- (b) (3 points) What is the average velocity of the rock between $t = 1$ second and $t = 3$ seconds?
- (c) (3 points) Find the instantaneous velocity of the rock at $t = 1$ second using the formula

$$s'(a) = \lim_{h \rightarrow 0} \frac{s(a + h) - s(a)}{a + h - a}.$$