M 408C Exam 1 Free Response (version B) October 1, 2013 Instructor: James Pascaleff

NAME: SOLUTIONS

EID:

INSTRUCTIONS:

- No books, notes, calculators, or other electronic devices. Do not look at anyone else's paper during the test.
- You must show your work to recieve full credit. No credit will be awarded for a mere numerical answer, even if the number is correct.
- Only answers written on these sheets will be graded. Work written on scratch paper will not be considered.

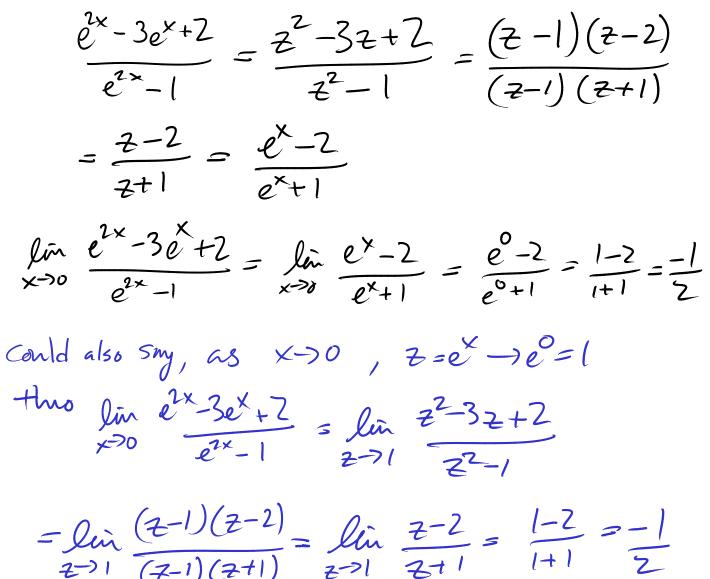
FOR OFFICIAL USE ONLY:

Problem	Possible	Actual
1	25	
2	25	
Total	50	

1. (25 points) Using the properties of limits that we have discussed in class, determine the limit

$$\lim_{x \to 0} \frac{e^{2x} - 3e^x + 2}{e^{2x} - 1}$$

To recieve full credit, you must show the steps that you use to arrive at your answer. Warning: No credit will be awarded for a solution using L'Hopital's rule. Hint: Let $z = e^x$. Then $e^{2x} = z^2$. Try to simplify.



- 2. (25 points total)
 - (a) (12 points) Consider three functions f(x), g(x) and h(x). By combining the product rule and the quotient rule, find a rule for the derivative of F = fg/h. That is, express

$$F' = \left(\frac{fg}{h}\right)'$$

in terms of $f,g,h,f^{\prime},g^{\prime},$ and $h^{\prime}.$ Show the steps in your argument.

(b) (13 points) Use this formula to compute F'(0) in the situation where f, g and h are the specific functions

$$f(x) = \sin x + \cos x$$
$$g(x) = (1 + x + 2x^2)$$
$$h(x) = e^x$$

Please note that you are not required to compute F'(x) as a function of x, you just need to compute F'(0).

$$f(o) = 1 \qquad f'(x) = \cos x - \sin x \qquad f'(o) = 1 g'(v) = 1 \qquad g'(x) = 1 + 4x \qquad g'(o) = 1 h'(v) = 1 \qquad h'(v) = v \qquad h'(o) = 1 f'(o) = h(o) (f(o)g(o) + f(o)g'(o)) - f(o)g(o)h'(o) (h(o))^{2} = \frac{1 [[1 + 1] + 1 + 1] - 1 + 1}{1^{2}} = \frac{[[1 + 1] - 1]}{1} = 1$$