

Fall 2005 GSU Mathematics Problem Competition – Problem Set 3

Due Date: Monday, Nov. 7 by 5p.m.

**Instructions:** Submit your solutions to the Mathematics office or to MP 3004 by the due date. Please include your name and e-mail address. Have fun! If you have any questions please contact skersey@GeorgiaSouthern.edu, or go to:

[http://www.cs.georgiasouthern.edu/faculty/kersey\\_s/private/competition/competitionS2005.html](http://www.cs.georgiasouthern.edu/faculty/kersey_s/private/competition/competitionS2005.html)

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1. (V. Maymeskul) Solve  $\sqrt[3]{6x + 28} - \sqrt[3]{6x - 28} = 2$ .

2. (R. Neal) Given that  $f(0) = 0$ ,  $f'(0) = 1$ ,  $f'(2) = 3$  and  $f''(2) = 5$ , find  $\int_0^1 x f'''(2x) dx$ .

3. (I. Smith)

(a) Find a matrix with characteristic equation  $\lambda^2 + \alpha \lambda + \beta = 0$ .

(b) Find a matrix with characteristic equation

$$\lambda^n + a_{n-1}\lambda^{n-1} + a_{n-2}\lambda^{n-2} + \cdots + a_2\lambda^2 + a_1\lambda + a_0 = 0.$$

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