Three Interpolation Problems
Due Tuesday Nov. 12 by 9:30 AM

1. Use MATLAB to determine a function of the form:

$$f(x) = a_1 e^x + a_2 e^{2x} + a_3 \sin(4x) + a_4 \cos(4x) + a_5 x^\pi$$

that satisfies these conditions:

$$f(0) = f(3)$$
$$\int_0^1 f(x)\,dx = 0$$
$$f'(1) + 2f'(2) = 0$$
$$f''(2) = 5$$
$$f(1) = 0$$

2. Use fzero to determine a function of the form:

$$f(x) = a_1 e^x + a_2 e^{x/2} + a_3 \sin(a_4 x)$$

that satisfies these conditions:

$$f(0) = 2$$
$$f(1) = 1$$
$$f(3) = 0$$
$$f(2) = 3$$

(Hint: You will have to build a function whose zero gives you one of the coefficients. That function might involve solving a linear system for the other three coefficients.)

3. Use MATLAB functions to determine a function of the form:

$$f(x) = a_1 + a_2 x^2 + a_3 \sin(x)$$

that satisfies these conditions:

$$f(0) = 2$$
$$f(1) = 1$$
$$\max_{0 \le x \le .5} |f(x)| = 2.5$$

(Hint: You might want to use fzero here and in such a way that fzero invokes fminbnd .)