Hints for <u>HW6</u>

MATH 46

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5/7/07

You will need to read (4.29) to (4.34) (p.236–7 of book). That's it.

Once you have solved the c_j coeffs, (4.31) can give you $u(x)$, as in (4.34)

The "spectrum" eigenvalues of K is same as those of A matrix.

The eigenfunc. of K is then $\sum c_j \alpha_j(x)$ where $\vec{c}$ is the eigenvec. of A.

All for my question A)... just work through as in Example 4.15

(Don't need any of §4.3.4)

#13 a Hint: $\int_0^{1/2} u(y)\,dy$ is constant (as a func of x). Call it c.
Now integrate the whole eqn, solve for $u(x)$. You don't need anything from §4.3.3–4.

b. Think in the same way.

c. Apply $n=1$ case of Example 4.15

#14. Nothing from book needed. Hint: what functional form in x must $Ku(x)$ take, regardless of form of u? So it there an eigenfunction (what if you put this in as u?) What is eigenvalue?

Remember $\boxed{Ku = \lambda u}$ defines eigenfunctions & eigenvalues.

#4. — all parts of #4 use same ideas you learned for Volterra, ie trying to turn it into an ODE IVP by repeated differentiation. Nothing new here.

b: Use
$$\int_0^1 \min(x,y)\, u(y)\, dy = \int_0^x y\, u(y)\, dy + x\int_x^1 u(y)\,dy$$

Set $\lambda u = Ku$ then differentiate twice, via Leibniz formula.

c: Use same ideas as b.

a: $\lambda u = Ku$ use Fourier series & the hint.

d: This is actually a <u>one-word answer</u> ... we did it in today's lecture.