Math 406 Homework 5

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Question 1a. For all functions v in some class, the following must be true:

$$\int_0^1 v(u'' + k^2 u - f)dx = 0.$$

Integrating by parts:

$$\int_0^1 -u'v' + k^2 uv - fvdx + v(1)\beta - v(0)u'(0) = 0 \implies \int_0^1 u'v'dx = k^2 \int_0^1 uvdx - \int_0^1 fvdx + \beta v(1).$$

Thus the weak form is to find $u \in H^1_\alpha$ such that $\int_0^1 u'v'dx = k^2 \int_0^1 uvdx - \int_0^1 fvdx + \beta v(1) \forall v \in H^1_0$.

Question 1b.