# Notes

February 14, 2014

## homework

### hw 16

lesson 10 exercise 3. Find the cosine transform $U(\omega, t)$ of the solution $u(x, t)$.

### hw 17

find the inverse transform $u(x, t)$. Hint use mathematica

### hw 18

plot the solutioon $u(x, t)$ for $t = 0.01, 0.1, 1.0$ (take $\alpha^2 = 1$)

## homework help

lesson 9. non-homogeneous pde. $u_t = \alpha u_{xx} + f(x, t)$ find fundamental solutions of the form $T(t)X(x)$ where $X(x)$ and $\lambda$ are eigendata for the homogeneous BC.

He wrote $-\lambda^2$ originally instead of $\lambda$.

The separation constant occurs

$$\frac{T'(t)}{\alpha^2 T(t)} = \frac{X''(x)}{X(x)} = \mu \text{ the separation constant}$$

To find the separation constant study the hom. BC. It's okay to restrict to $\leq 0$

## question?

$$I = \int_0^\infty \frac{\sin(\omega x}{\omega} e^{-\alpha^2 \omega^2 t} \, \mathrm{d}\omega = \int_0^\infty \frac{\sin(\frac{x}{\alpha\sqrt{t}} s)}{s} e^{-s^2} \, \mathrm{d}s$$

$$I(\beta) = \int_0^\infty \frac{\sin(\beta s}{s} e^{-s^2} \, \mathrm{d}s \qquad \beta = \frac{x}{\alpha\sqrt{t}}$$

Do we know any special values for $I(\beta)$?

$$\beta = 0 \qquad\qquad I = 0$$

$$= \int_0^\infty \frac{\sin(\beta s)}{s} \, \mathrm{d}s = \int_0^\infty \frac{\sin(s)}{s} \, \mathrm{d}s = \frac{\pi}{2}$$

$$s \leftarrow \frac{s}{\beta}$$