

Dr. Z.'s Calc5 Homework assignment 19

Version of Dec. 5, 2011 (thanks to Dat Nguen, typo in #6 corrected.)

1. Find the Laplace Transform of the pde $19u_{xxx} - 7u_{xx} = u_{tt} + 4u_t - 11u$, $t > 0$.
2. Find the Laplace Transform of the pde $29u_{xxx} - 17u_{xx} = u_{ttt} + 4u_{tt} - 11u_t + 5u$, $t > 0$.
3. Find the Laplace Transform of the pde $29u_{xx} + 17u_{xt} + 11u_{tt} = 0$, $t > 0$.
4. Solve the pde

$$u_{xx} = u_{tt} \quad , 0 < x < \pi \quad , \quad t > 0 \quad ,$$

subject to the **boundary-conditions**

$$u(0, t) = 0 \quad , \quad u(\pi, t) = 0 \quad , \quad t > 0 \quad ,$$

and the **initial conditions**

$$u(x, 0) = 0 \quad , \quad u_t(x, 0) = 3 \sin x - 5 \sin 4x \quad , \quad 0 < x < \pi \quad .$$

5. Solve the pde

$$u_{xx} + \sin x \sin 3t = u_{tt} \quad , 0 < x < \pi \quad , \quad t > 0 \quad ,$$

subject to the **boundary-conditions**

$$u(0, t) = 0 \quad , \quad u(\pi, t) = 0 \quad , \quad t > 0 \quad ,$$

and the **initial conditions**

$$u(x, 0) = 0 \quad , \quad u_t(x, 0) = 0 \quad , \quad 0 < x < \pi \quad .$$

6. Solve the pde

$$u_{xx} + 6 \sin 2x \sin t = u_{tt} \quad , 0 < x < \frac{\pi}{2} \quad , \quad t > 0 \quad ,$$

subject to the **boundary-conditions**

$$u(0, t) = 0 \quad , \quad u(\pi/2, t) = 0 \quad , \quad t > 0 \quad ,$$

and the **initial conditions**

$$u(x, 0) = 0 \quad , \quad u_t(x, 0) = 0 \quad , \quad 0 < x < \pi/2 \quad .$$