Math 333 Homework Problems #6a

APPLIED PARTIAL DIFFERENTIAL EQUATIONS ... (4TH EDITION), by R. Haberman

4. WAVE EQUATIONS: VIBRATING STRINGS AND MEMBRANES

4.4. Vibrating string with fixed ends

- 4.4.3, 4.4.4, 4.4.10, 4.4.13
- 4.4.14 If a time-independent external body force is applied to the string, then under the appropriate renormalization one sees that the governing equation of motion is given by

$$\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2} + q(x); \qquad u(0,t) = u(\pi,t) = 0, \quad u(x,0) = f(x), \quad \frac{\partial u}{\partial t}(x,0) = g(x).$$

Under the assumption that $q(0) = q(\pi) = 0$, find the solution.