

You must show **all** work to receive full credit. All work is to be your own.

December 2

This is a closed books and notes test. Be organized. Total points: **24**

**19:50 - 19:55**

Submit a single black/white pdf file to BB, named using your last name. 20% noncompliance penalty

1. Determine whether the method of separation of variables can be used to replace the given partial differential equation by a pair of ordinary differential equations. If so, find the equations.

20 points

$$[p(x) u_x]_x - r(x) u_{tt} = 0$$

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2. §12.4 D'Alembert's Solution of the Wave Equation

4 points

Show that because of the boundary conditions

$$(a) u(0, t) = 0, \quad (b) u(L, t) = 0 \quad \text{for all } t \geq 0$$

the function  $f$  in

$$u(x, t) = \frac{f(x + ct) + f(x - ct)}{2}$$

must be odd and of period  $2L$ .