Quiz 2 **Name:** ______________________________

MATH 3150, Section 004 January 23, 2019

For all the following multiple-choice questions, circle your answers clearly. No partial credit will be awarded; any scratch work will be ignored.

1. An equilibrium solution u_e for the heat equation (with appropriate initial and boundary conditions) satisfies which of the following properties in general?

(a) u_e does *not* respect the boundary conditions.

(b) $u_e = 0$.

(c) u_e does *not* depend on time t.

(d) u_e is a quadratic function.

(e) u_e cannot be computed.

2. Suppose that $u_1(x,t)$ and $u_2(x,t)$ are two solutions to the linear, homogeneous heat equation. Which of the following results from the principle of superposition applied to the linear homogeneous heat equation?

(a) There are no other solutions to this equation.

(b) $u(x,t) = u_1(x,t)u_2(x,t)$ is a solution to this equation.

(c) $u(x,t) = u_1(x,t) + u_2(x,t)$ is a solution to this equation.

(d) Either $u_1(x,t)$ or $u_2(x,t)$ must equal the equilibrium solution $u_e(x)$.

(e) Both $u_1(x,t)$ and $u_2(x,t)$ must be constant functions.

3. With u_1 and u_2 arbitrary functions, c_1 and c_2 arbitrary constants, and L an operator, which of the following is the definition of linearity of L?

(a) $L[c_1c_2u_1u_2] = c_1c_2u_1u_2$

(b) $L[c_1u_1 + c_2u_2] = c_1L[u_1] + c_2L[u_2]$

(c) $c_1L[u_1] = c_2L[u_2]$

(d) $c_1L[u_1] + c_2L[u_2] = 0$

(e) $c_1 + c_2 = L[u_1] + L[u_2]$