The heat equation (in cartesian coordinates) is $u_t = ku_{xx}$ for a constant $k > 0$. Take the domain to be $-\infty < x < \infty, t > 0$. Interpret $t$ as representing time and $x$ as representing a spatial coordinate. The heat equation relates the first time derivative to the second spatial derivative. We can think of $u_t$ as the rate of change in $u$ with respect to $t$ and $u_{xx}$ as the concavity of $u$ with respect to $x$. The heat equation is then a relation between the time rate of change of $u$ and the spatial concavity of $u$. Your goal for this exam is to describe general properties of heat equation solutions by considering this view of the heat equation. Your response should include both general descriptions of properties that are true for all heat equation solutions and an illustration of each property using the specific solution given in Section 1.1 #1.