11. Find the solution of $u_x - u_t + 2u = 1$ that satisfies $u(x, 0) = x^2$.

12. Consider the PDE $u_x + u_t = u + e^{x-t}$.

    (a) Using the geometric method, find the general solution.

    (b) Find the solution u with $u(x, 0) = g(x)$, where g is an arbitrary differentiable function.

    (c) Find the solution u with $u(x, 1) = g(x)$, where g is an arbitrary differentiable function.

13. Find the solution of $u_x + u_t + u = e^{x+2t}$ that satisfies $u(x, 0) = 0$.

14. Find the solution of $2u_x + 3u_t = 4u + x$ that satisfies $u(x, 0) = 9x^2$.

15. Find the general solutions of the following equations:

    (a) $xu_x + tu_t = 0$;

    (b) $xu_x + tu_t = t$;

    (c) $xu_x + tu_t = t^2 + x^3$;

    (d) $(1 + x^2)u_x + u_t = 0$.

16. Find the solution of $\sqrt{1 - x^2}u_x + u_t = 0$ that satisfies $u(0, t) = t$.

17. Find the solution of $tu_x + xu_t = 0$ that satisfies $u(0, t) = e^{-t^2}$.

18. Find the solution of $xu_t = tu_x$ that satisfies $u(x, 0) = 3x$.

19. Find the solution of $(t + x)u_x + (t - x)u_t = 0$ that satisfies $u(\cos(s), \sin(s)) = 1$ for all $s \in [0, 2\pi]$.

20. Find the general solution of $xu_x + u_y + (1 + z^2)u_z = x + y$.