

Math 351
Spring, 2008

Partial solutions for: Practice Problems 1

1. (a) 2nd order, linear
(b) 1st order, nonlinear
(c) 2nd order, nonlinear
(d) 2nd order, linear
2. (a) $u(x, t) = t \sin(x)$ is a solution of problem 1(a). Verify by substituting into the PDE.
(b) $w(x, t) = t(1 - x)$ is NOT a solution of problem 1(b).
3. Verify by substituting functions into the PDE.
4. Put PDE in the form

$$Au_{xx} + 2Bu_{xy} + Cu_{yy} + Du_x + Eu_y + Fu + G = 0$$

and look at discriminant $B^2 - AC$ (> 0 means hyperbolic, $= 0$ means parabolic, < 0 means elliptic).

- (a) hyperbolic
- (b) parabolic
- (c) parabolic
- (d) elliptic
- (e) hyperbolic