

# EVOLUTION AND THE THEORY OF GAMES

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*Exercises 07-11-2011*

5. Find all Nash equilibria (mixed and pure) of the Hawk-Dove game for  $R > C$  and for  $R < C$ :

	H	D
H	$(R - C)/2, (R - C)/2$	$R, 0$
D	$0, R$	$R/2, R/2$

6. Suppose that  $(\hat{x}, \hat{y})$  is a Nash equilibrium. Show that  $\pi_1(x, \hat{y}) = \pi_1(\hat{x}, \hat{y})$  for every pure strategy  $x$  in the support of  $\hat{x}$ .

7. Show that every dominating strategy solution is a Nash equilibrium, but that the reverse is not necessarily true.

8. Show that if  $x \in \mathbb{X}$  is a *strictly* dominated pure strategy and  $(\hat{x}, \hat{y}) \in \mathbb{X} \times \mathbb{Y}$  is a Nash equilibrium, then  $x$  cannot be in the support of  $\hat{x}$ . Show by example that this conclusion need not be true if  $x$  is only *weakly* dominated, e.g., as for the following payoff matrix:

	$y_1$	$y_2$	$y_3$
$x_1$	$3, 2$	$3, 0$	$2, 2$
$x_2$	$1, 0$	$3, 3$	$0, 3$
$x_3$	$0, 2$	$0, 0$	$3, 2$