

Name: \_\_\_\_\_

## Admissible Heuristics

The Eight Puzzle consists of eight tiles, numbered 1 through 8, placed into a 3-by-3 board. Pieces are initially out of order, and they must be moved into standard 1-8 order by sliding one tile at a time into the empty square on the board. Let's assume the goal state is as shown here in G:

G:

	<b>1</b>	<b>2</b>
<b>3</b>	<b>4</b>	<b>5</b>
<b>6</b>	<b>7</b>	<b>8</b>

J:

<b>4</b>		<b>2</b>
<b>1</b>	<b>6</b>	<b>3</b>
<b>7</b>	<b>8</b>	<b>5</b>

Consider the following heuristics. For each one (except perhaps the Sum of Euclidean distances), compute its value  $h_i(J)$  for the state J given above. (When computing sums over the tiles, do not include the blank space as if it were a tile.)

Determine whether the heuristic is admissible. Explain why or why not. Finally, if it is admissible, determine what other heuristics it dominates.

Heuristic	$h_i(J)$	Admissible?	Why or why not ?	Dominates...
$h_0(n)$ = Zero	0	Y	Can never overestimate true distance to G.	none
$h_1(n)$ = Hamming (number of tiles out of place)				
$h_2(n)$ = Manhattan distance of tile 1 alone.				
$h_3(n)$ = Sum of Manhattan distances for all 8 tiles.				
$h_4(n)$ = Sum of only the horizontal components of the Manhattan distance for all 8 tiles.				
$h_5(n)$ = Sum of only the vertical components of the Manhattan distance for all 8 tiles.				
$h_6(n)$ = Sum of Euclidean distances for all 8 tiles.				