Quiz 7 Solutions

1. Consider the following example for questions (a)–(g).

9	6	2	7
A	C	C	B
C	B	A	A
B	A	B	C

ballot change
$\xrightarrow{\text{for } A}$

9	6	2	7
A	C	**A**	B
C	B	**C**	A
B	A	B	C

(a) Who is/are the winners for plurality in the election on the left? (1 pt) $W_P = \{\, A \,\}$

(b) Who is/are the winners for runoff in the election on the left? (1 pt) $W_R = \{\, A \,\}$

(c) Consider the ballot change favorable to A, pictured above right.
   After this ballot change:

   i. What is the NEW winner set for plurality? (1 pt) $W'_P = \{\, A \,\}$

   ii. What is the NEW winner set for runoff? (1 pt) $W'_R = \{\, B \,\}$

(d) Which winner selection method <u>fails</u> to satisfy monotonicity <u>for this example</u>?
   <u>Circle all the apply</u> (2 pts):

   plurality $\boxed{\text{runoff}}$

   Choose <u>one</u> of the above and explain why it does or does not satisfy monotonicity <u>for this example</u>
   (2 pts):

   - Plurality is always monotonic. We see that illustrated in this example because A is a winner, and when we do a ballot change favorable to A, nothing happens - A is still a winner.
   - Runoff is not monotonic. In this example, A wins by runoff. We do a ballot change favorable to A, and now B wins by runoff and A loses. The ballot change favorable to A turned A from a winner into a loser. So runoff fails the monotonicity property.

2. Circle T if the claim is true, F if the claim is false. (1pt each)

   (a) The beatpath method is a priori Smith fair. $\boxed{\text{T}}$ F

   (b) The beatpath method has no <u>losing</u> spoilers ever.   T $\boxed{\text{F}}$

   (a) Seen in class, details verified in exercise 6.5.
   (b) Exercise 6.6.