

Programming Challenge

Consider time intervals, where the starting point and ending point are both in the same day and are expressed in military time (for example, "00:01" for one minute after midnight, or "15:30" for 3:30pm). We'll represent a time interval as a two-word sentence whose first word is the starting time and whose second word is the ending time. Both times will be five-character words: the first two characters will be the hours (a two-digit quantity ranging from 00 to 23), followed next by a colon, and then the minutes (ranging from 00 to 59). Thus we'll assume that any time in a time interval has two digits on the left of the colon and two digits on the right of the colon.

Write a procedure `overlap-amount` that, given two time intervals, returns *the number of minutes* in their overlap. (If each interval represents the time that a person is in a room, then `overlap-amount` will return the amount of time that both people are in the room together.) Some examples:

<i>expression</i>	<i>intended result</i>
<code>(overlap-amount '(07:30 12:00) '(11:01 14:00))</code>	<code>; 60, since the overlap is 11:01 through 12:00</code>
<code>(overlap-amount '(07:30 12:00) '(08:15 10:00))</code>	<code>; 106, since the overlap is 8:15 through 10:00</code>
<code>(overlap-amount '(07:30 12:00) '(06:59 07:31))</code>	<code>; 2, since the overlap is 7:30 through 7:31</code>
<code>(overlap-amount '(07:30 12:00) '(12:00 14:00))</code>	<code>; 1, since the overlap is 12 noon through 12 noon</code>
<code>(overlap-amount '(07:30 12:00) '(12:01 14:00))</code>	<code>; 0 since the intervals don't overlap</code>
<code>(overlap-amount '(07:30 12:00) '(01:01 07:15))</code>	<code>; 0 because the intervals don't overlap</code>
<code>(overlap-amount '(07:30 12:00) '(07:00 01:35))</code>	<code>; 0 because of the empty interval</code>

Assume that the arguments are legal time intervals. Use helper procedures where appropriate; also use `item` and `member?` instead of large conditionals if possible to streamline your code. Use good names for your placeholders and helper procedures. Don't forget the lessons of the case study.