Section 2.4

1 Find digits a, b, and c (between 0 and 4) such that $(abc)_5 = (cba)_8$, or prove that there are none.

Solution $(abc)_5 = 25a + 5b + c$ and $(cba)_8 = 64c + 8b + a$. If $(abc)_5 = (cba)_8$, then $25a + 5b + c = 64c + 8b + a$, or $24a - 3b - 63c = 0$. This simplifies to $8a - b - 21c = 0$. The only solution (easily seen by trial and error) is $a = b = 3$ and $c = 1$. Hence $(331)_5 = (133)_8 = 91$.