► **Problem 4.5-23(b)(d)(e)** Suppose $p = 17$, $q = 23$, and $s = 5$. How would you encode each of the following "messages"?

(b) **HELP**

(d) **BYE**

(e) **NOW**

Solution.

$$r = p \cdot q = 17 \times 23 = 391.$$

(b) **HELP** corresponds to the number 08051216.

Thus, $E = (8051216)^5 \pmod{391} = 33$.

(d) **BYE** corresponds to the number 022505.

Thus, $E = (22505)^5 \pmod{391} = 97$.

(e) **NOW** corresponds to the number 141523.

Thus, $E = (141523)^5 \pmod{391} = 104$. $\qquad\square$