1

Algorithm 8.1. Modified Gram–Schmidt

for $i = 1$ to n
  $v_i = a_i$
for $i = 1$ to n
  $r_{ii} = \|v_i\|$ → mult: m, add: m−1
  $q_i = v_i / r_{ii}$ → div: m
  for $j = i+1$ to n
    $r_{ij} = q_i^* v_j$ → mult: m, add: m−1
    $v_j = v_j - r_{ij} q_i$ → sub: m, mult: m

$$\therefore \text{add}$$

$$(m-1)\times n + \sum_{i=1}^{n} (m-1)\left(\frac{n(n+1)}{2} - \frac{i(i+1)}{2}\right)$$

$$\text{sub}$$

$$m \sum_{i=1}^{n} \left(\frac{n(n+1)}{2} - \frac{i(i+1)}{2}\right)$$

$$\text{div} \qquad mn$$

$$\text{mult} \qquad mn + m \sum_{i=1}^{n} (n(n+1) - i(i+1))$$

3

Algorithm 8.1. Modified Gram–Schmidt

for $i = 1$ to n
  $v_i = a_i$
for $i = 1$ to n
  $r_{ii} = \|v_i\|$
  $q_i = v_i / r_{ii}$
  for $j = i+1$ to n
    $r_{ij} = q_i^* v_j$
    $v_j = v_j - r_{ij} q_i$

$$R_i = \begin{bmatrix} I_{(i-1)\times(i-1)} & 0 \\ & \begin{matrix} 1/r_{ii} & -r_{i,i+1}/r_{ii} & \cdots & -r_{i,n}/r_{ii} \\ 0 & 1 & & 0 \\ 0 & 0 & & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & & 1 \end{matrix} \end{bmatrix}$$

$(n-i+1)$ rows, $(n-i+1)$ columns