Step	Algorithm:
1a	
4	where
2	
3	while do
2,3	$\wedge$
5a	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg($ $)$
1b	

Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
1a	$a = \widehat{a}$
4	$x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$ where x_T has 0 rows, y_T has 0 rows
2	$a = x_T^T y_T + \widehat{a}$
3	while $m(x_T) < m(x)$ do
2,3	$a = x_T^T y_T + \widehat{a} \wedge m(x_T) < m(x)$
5a	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$ where α_1 has 1 row, β_1 has 1 row
6	$a = x_T^T y_T + \widehat{a} = x_0^T y_0 + \widehat{a}$
8	$a = x_0^T y_0 + \alpha\beta + \widehat{a} = \alpha\beta + a$
5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$
7	$a = \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \end{array}\right)^T \left(\begin{array}{c} y_0 \\ \hline \beta_1 \end{array}\right) + \widehat{a} = x_0^T y_0 + \alpha\beta + \widehat{a}$
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2,3	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
1b	$a = x^T y + \widehat{a}$

Algorithm: $[x, y] := \textsc{Sap\_Dot\_Var1\_unb\_var4}(x, y)$

$x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$

where x_T has 0 rows, y_T has 0 rows

while $m(x_T) < m(x)$ **do**

$$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right), \quad \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$$

where α_1 has 1 row, β_1 has 1 row

$$a = x_0^T y_0 + \alpha\beta + \widehat{a} = \alpha\beta + a$$

$$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right), \quad \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$$

endwhile

Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
1a	$a = \widehat{a}$
4	where
2	
3	while do
2,3	$\wedge$
5a	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg($ $)$
1b	$a = x^T y + \widehat{a}$

Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
1a	$a = \widehat{a}$
4	where
2	$a = x_T^T y_T + \widehat{a}$
3	while do
2,3	$a = x_T^T y_T + \widehat{a} \wedge$
5a	where
6	
8	
5b	
7	
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2	$a = x_T^T y_T + \widehat{a} \wedge \neg($ $)$
1b	$a = x^T y + \widehat{a}$

Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
1a	$a = \widehat{a}$
4	where
2	$a = x_T^T y_T + \widehat{a}$
3	while $m(x_T) < m(x)$ do
2,3	$a = x_T^T y_T + \widehat{a} \wedge m(x_T) < m(x)$
5a	where
6	
8	
5b	
7	
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2,3	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
1b	$a = x^T y + \widehat{a}$

Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
1a	$a = \widehat{a}$
4	$x \rightarrow \left(\frac{x_T}{x_B}\right)$, $y \rightarrow \left(\frac{y_T}{y_B}\right)$ where x_T has 0 rows, y_T has 0 rows
2	$a = x_T^T y_T + \widehat{a}$
3	while $m(x_T) < m(x)$ do
2,3	$a = x_T^T y_T + \widehat{a} \wedge m(x_T) < m(x)$
5a	where
6	
8	
5b	
7	
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2,3	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
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Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
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4	$x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$ where x_T has 0 rows, y_T has 0 rows
2	$a = x_T^T y_T + \widehat{a}$
3	while $m(x_T) < m(x)$ do
2,3	$a = x_T^T y_T + \widehat{a} \wedge m(x_T) < m(x)$
5a	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$ where α_1 has 1 row, β_1 has 1 row
6	
8	
5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$
7	
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2,3	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
1b	$a = x^T y + \widehat{a}$

Step	Algorithm: $[x, y] := \textsc{Sap\_Dot\_Var1\_unb\_var4}(x, y)$
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2	$a = x_T^T y_T + \widehat{a}$
3	while $m(x_T) < m(x)$ do
2,3	$a = x_T^T y_T + \widehat{a} \wedge m(x_T) < m(x)$
5a	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$ where α_1 has 1 row, β_1 has 1 row
6	$a = x_T^T y_T + \widehat{a} = x_0^T y_0 + \widehat{a}$
8	
5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$
7	
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2,3	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
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Step	Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$
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2	$a = x_T^T y_T + \widehat{a}$
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5a	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$ where α_1 has 1 row, β_1 has 1 row
6	$a = x_T^T y_T + \widehat{a} = x_0^T y_0 + \widehat{a}$
8	
5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$
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2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
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1a	$a = \widehat{a}$
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2	$a = x_T^T y_T + \widehat{a}$
3	while $m(x_T) < m(x)$ do
2,3	$a = x_T^T y_T + \widehat{a} \wedge m(x_T) < m(x)$
5a	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$ where α_1 has 1 row, β_1 has 1 row
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5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$
7	$a = \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \end{array}\right)^T \left(\begin{array}{c} y_0 \\ \hline \beta_1 \end{array}\right) + \widehat{a} = x_0^T y_0 + \alpha\beta + \widehat{a}$
2	$a = x_T^T y_T + \widehat{a}$
	endwhile
2,3	$a = x_T^T y_T + \widehat{a} \wedge \neg(m(x_T) < m(x))$
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Step	Algorithm: $[x,y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x,y)$
	$x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$ where x_T has 0 rows, y_T has 0 rows
	while $m(x_T) < m(x)$ do
	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$ where α_1 has 1 row, β_1 has 1 row
	$a = x_0^T y_0 + \alpha\beta + \widehat{a} = \alpha\beta + a$
	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{array}\right)$
	endwhile

Algorithm: $[x, y] := \text{SAP\_DOT\_VAR1\_UNB\_VAR4}(x, y)$

$x \rightarrow \left(\frac{x_T}{x_B}\right)$, $y \rightarrow \left(\frac{y_T}{y_B}\right)$

where x_T has 0 rows, y_T has 0 rows

while $m(x_T) < m(x)$ **do**

$$\left(\frac{x_T}{x_B}\right) \rightarrow \begin{pmatrix} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{pmatrix}, \quad \left(\frac{y_T}{y_B}\right) \rightarrow \begin{pmatrix} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{pmatrix}$$

where α_1 has 1 row, β_1 has 1 row

$$a = x_0^T y_0 + \alpha\beta + \widehat{a} = \alpha\beta + a$$

$$\left(\frac{x_T}{x_B}\right) \leftarrow \begin{pmatrix} x_0 \\ \hline \alpha_1 \\ \hline x_2 \end{pmatrix}, \quad \left(\frac{y_T}{y_B}\right) \leftarrow \begin{pmatrix} y_0 \\ \hline \beta_1 \\ \hline y_2 \end{pmatrix}$$

endwhile