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: $[\alpha] := \textsc{Sapdot\_unb\_var1}(x, y, \alpha)$
1a	$\alpha = \widehat{\alpha}$
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	$\alpha = \widehat{\alpha} + x_T^T y_T$
3	while $m(x_T) < m(x)$ do
2,3	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge m(x_T) < m(x)$
5a	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$ where χ_1 has 1 row, ψ_1 has 1 row
6	$\alpha = \widehat{\alpha} + x_0^T y_0$
8	$\alpha := \alpha + \chi_1 \psi_1$
5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
7	$\alpha = \widehat{\alpha} + x_0^T y_0 + \chi_1 \psi_1$
2	$\alpha = \widehat{\alpha} + x_T^T y_T$
	endwhile
2,3	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge \neg(m(x_T) < m(x))$
1b	$[\alpha] = \text{Sapdot}(x, y, \widehat{\alpha})$

Algorithm: $[\alpha] := \text{SAPDOT\_UNB\_VAR1}(x, y, \alpha)$

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

where x_T has 0 rows, y_T has 0 rows

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

$$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

where χ_1 has 1 row, ψ_1 has 1 row

$\alpha := \alpha + \chi_1 \psi_1$

$$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

endwhile

Step	Algorithm: $[\alpha] := \text{SAPDOT\_UNB\_VAR1}(x, y, \alpha)$
1a	$\alpha = \widehat{\alpha}$
4	where
2	
3	while do
2,3	$\wedge$
5a	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg(\quad)$
1b	$[\alpha] = \text{Sapdot}(x, y, \widehat{\alpha})$

Step	Algorithm: $[\alpha] := \textsc{Sapdot\_unb\_var1}(x, y, \alpha)$
1a	$\alpha = \widehat{\alpha}$
4	where
2	$\alpha = \widehat{\alpha} + x_T^T y_T$
3	while do
2,3	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge$
5a	where
6	
8	
5b	
7	
2	$\alpha = \widehat{\alpha} + x_T^T y_T$
	endwhile
2	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge \neg(\quad)$
1b	$[\alpha] = \mathrm{Sapdot}(x, y, \widehat{\alpha})$

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1a	$\alpha = \widehat{\alpha}$
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3	while $m(x_T) < m(x)$ do
2,3	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge m(x_T) < m(x)$
5a	where
6	
8	
5b	
7	
2	$\alpha = \widehat{\alpha} + x_T^T y_T$
	endwhile
2,3	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge \neg(m(x_T) < m(x))$
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Step	Algorithm: $[\alpha] := \textsc{Sapdot\_unb\_var1}(x, y, \alpha)$
1a	$\alpha = \widehat{\alpha}$
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	$\alpha = \widehat{\alpha} + x_T^T y_T$
3	while $m(x_T) < m(x)$ do
2,3	$\alpha = \widehat{\alpha} + x_T^T y_T \wedge m(x_T) < m(x)$
5a	where
6	
8	
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	endwhile
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6	
8	
5b	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
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2	$\alpha = \widehat{\alpha} + x_T^T y_T$
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	$x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$ where x_T has 0 rows, y_T has 0 rows
	while $m(x_T) < m(x)$ do
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	$\alpha := \alpha + \chi_1 \psi_1$
	$\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
	endwhile

Algorithm: $[\alpha] := \textsc{Sapdot\_unb\_var1}(x, y, \alpha)$

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

where x_T has 0 rows, y_T has 0 rows

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

$$\left(\frac{x_T}{x_B}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \; \left(\frac{y_T}{y_B}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

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$$\alpha := \alpha + \chi_1 \psi_1$$

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endwhile