Solutions: Simple Interest

 # 1: Using the formula for simple interest, the cash in the deposit in 120 days is

$$
\begin{aligned}
V(120\text{days}) &= \left(1 + \frac{120}{365} \times 0.04\right) \times 500 \\
&= \$506.48
\end{aligned}
$$

 # 2: Let r be the simple interest rate the the deposit was invested at. In order to use the simple interest formula we must count the the number of days between March 15 and December 31. We have

$$
\begin{aligned}
\text{Total days between payments} &= \\
\text{days left in March:} &\quad 16 \\
\text{April:} &\quad +\ 30 \\
\text{May:} &\quad +\ 31 \\
\text{June:} &\quad +\ 30 \\
\text{July:} &\quad +\ 31 \\
\text{August:} &\quad +\ 31 \\
\text{September:} &\quad +\ 30 \\
\text{October:} &\quad +\ 31 \\
\text{November:} &\quad +\ 30 \\
\text{December days to payment:} &\quad +\ 31 \\
&=\ 291\text{days}
\end{aligned}
$$

The interest rate r must satsify the following equation, which we solve for r:

$$
\begin{aligned}
\left(1 + \frac{291}{365}r\right) \times 1250 &= 1300 \\
\implies 1 + \frac{291}{365}r &= \frac{1300}{1250} \\
\implies r &= \frac{365}{291}\left(\frac{1300}{1250} - 1\right) \\
&= 0.05017 \\
&= 5.02\%
\end{aligned}
$$