

$$\begin{aligned}
(a+b+c+d)(x+y+z+w) &= (a+(b+c+d))(x+y+z+w) \\
&= a(x+y+z+w) + (b+c+d)(x+y+z+w) \\
&= a(x+y+z+w) + (b+(c+d))(x+y+z+w) \\
&= a(x+y+z+w) + b(x+y+z+w) \\
&\quad + (c+d)(x+y+z+w) \\
&= a(x+y+z+w) + b(x+y+z+w) \\
&\quad + c(x+y+z+w) + d(x+y+z+w) \\
&= ax + ay + az + aw + bx + by + bz + bw \\
&\quad + cx + cy + cz + cw + dx + dy + dz + dw.
\end{aligned}$$