

$$\begin{aligned} \textcircled{1} \text{ a) } \int_{20}^{40} \int_{10}^{30} f(x,y) dx dy &= [(6+7+7+8) + (7+8+9+10)] (10)(10)^{\frac{1}{2}} \\ &= [28+34] (10)(10) \\ &= 6200 \text{ ft}^3 + \frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{b) } \int_0^{10} \int_{10}^{30} f(x,y) dy dx &= [(4+5) + (5+6) + (5+7) + (6+7)] (10)(10) \\ &= [9+11+12+13] (10)(10) \\ &= 4500 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \text{ a) } \int_1^3 \int_1^2 (x+2y) dy dx &= \int_1^3 [xy + y^2]_1^2 dx \\ &= \int_1^3 [(2x+4) - (x+1)] dx \\ &= \int_1^3 (x+3) dx \\ &= \left. \frac{1}{2}x^2 + 3x \right|_1^3 \\ &= \left(\frac{9}{2} + 9 \right) - \left(\frac{1}{2} + 3 \right) \\ &= 10 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \text{ b) } \int_1^4 \int_0^3 12xy \, dx \, dy &= \int_1^4 [6x^2y]_0^3 \, dy \\ &= \int_1^4 54y \, dy \\ &= 27y^2 \Big|_1^4 \\ &= 432 - 27 \\ &= 405 \end{aligned}$$