

**10.5 (a)**

$$\begin{aligned}d(B_t^2 - t) &= 2B_t dB_t + \frac{1}{2}2\text{Var}_t(dB_t) - dt \\ &= 2B_t dB_t\end{aligned}$$

**(b)**

$$\begin{aligned}d(B_t^3 - tB_t) &= 3B_t^2 dB_t + \frac{1}{2}6B_t \text{Var}_t(dB_t) - B_t dt - t dB_t \\ &= 2B_t dt + (3B_t^2 - t) dB_t\end{aligned}$$

**(c)**

$$\begin{aligned}de^{B_t} &= e^{B_t} dB_t + \frac{1}{2}e^{B_t} \text{Var}_t(dB_t) \\ &= e^{B_t} dB_t + \frac{1}{2}e^{B_t} dt.\end{aligned}$$