Common Mistakes! (HW1) M.265

1. (c)

① $t^2 y = -t\cos t + \sin t + C_1$

$\Rightarrow y = -\frac{\cos t}{t^2} + \frac{\sin t}{t^2} + C_2$ ← Don't forget to divide every term by the t^2

$C_2 \neq \frac{C_1}{t^2}$

★ Similar mistakes in 1(d) & 5(a)(b)!

$\int t \cdot \sin t\, dt = \int t\, d(\cos t) = t\cos t - \int \cos t\, dt$

miss "−" here

$\int t\sin t\, dt = -t\cos t + \sin t$ ← the correct version

2. $e^{2\ln t} = e^{\ln t^2} = t^2$

and similar simplifications involving exponential fn and ln.

5d: $V(t) = e^{-t}$ was not constant in this problem – note for the integration step

$\frac{d}{dt}\left(e^{\frac{t}{RC}} q\right) = e^{\frac{t}{RC}} \frac{e^{-t}}{R}$ ← $V(t)$

so $e^{\frac{t}{RC}} q = \frac{1}{R}\int e^{\frac{t}{RC}} e^{-t}\, dt + C_1$

6a: The volume $V(t)$ was not constant – need to write

$\frac{d[V(t)c(t)]}{dt} = V'(t)c(t) + V(t)c'(t)$

3: Direction field is always parallel to solution curves