**8.4.7** Since $t^2 - 5t + 6 = (t-2)(t-3)$ and $t^2 + 8$ is the same degree, somehow

$$\frac{t^2+8}{t^2-5t+6} = A + \frac{B}{t-2} + \frac{C}{t-3}.$$

Multiplying by the common denominator,

$$t^2 + 8 = At^2 - 5At + 6A + Bt - 3B + Ct - 2C.$$

Gathering like terms,

$$\begin{aligned} A &= 1, \\ -5A + B + C &= 0, \text{ and} \\ 6A - 3B - 2C &= 8; \end{aligned}$$

so $A = 1$, $B = -12$, and $C = 17$. Therefore,

$$\frac{t^2+8}{t^2-5t+6} = 1 - \frac{12}{t-2} + \frac{17}{t-3}.$$

(It follows that

$$\int \frac{t^2+8}{t^2-5t+6}\,\mathrm{d}t = t - 12\ln|t-2| + 17\ln|t-3| + C,$$

although this wasn't asked for.)