7.5. [We need to know also that S and D have the same variance.] Let $S = X+Y$ and $D = X-Y$. Note that $X = (S+D)/2$ and $Y = (S-D)/2$. Thus,

$$\mathrm{E}\left[e^{itX+isY}\right] = \mathrm{E}\left[2^{it(S+D)/2+is(S-D)/2}\right] = \mathrm{E}\left[e^{i(t+s)S/2}\right]\mathrm{E}\left[e^{i(t-s)D/2}\right],$$

by the independent of S and D. Now suppose S is $N(\mu,\sigma^2)$ and D is $N(\nu,\sigma^2)$. Then,

$$\begin{aligned}\mathrm{E}\left[e^{itX+isY}\right] &= e^{i(t+s)\mu/2}e^{i(t-s)\nu/2}e^{-(t+s)^2\sigma^2/8}e^{-(t-s)^2\sigma^2/8}\\ &= e^{\frac{1}{2}it(\mu+\nu)-\frac{1}{8}t^2(\sigma^2+\sigma^2)}e^{\frac{1}{2}is(\mu-\nu)-\frac{1}{8}s^2(\sigma^2+\sigma^2)},\end{aligned}$$

which is the desired result.