Problem 6.8

Starting with Eq. (3) in the solution to Problem 6.7, reproduced here for $0 < \alpha \leq 1$:

$$p(t) = \text{sinc}(2B_0 t)\left(\frac{\cos(2\pi\alpha B_0 t)}{1 - 16\alpha^2 B_0^2 t^2}\right)$$

For $\alpha = 1$, this formula reduces to

$$p(t) = \text{sinc}(2B_0 t)\left(\frac{\cos(2\pi B_0 t)}{1 - 16 B_0^2 t^2}\right) \qquad (1)$$

Next, using the trigonometric identity

$$\sin(A)\cos(A) = \frac{1}{2}\sin(2A)$$

and the definition of the sinc function

$$\text{sinc}(x) = \frac{\sin(\pi x)}{\pi x}$$

we may go on to write

$$\begin{aligned}\text{sinc}(2B_0 t)\cos(2\pi B_0 t) &= \frac{\sin(2\pi B_0 t)\cos(2\pi B_0 t)}{2\pi B_0 t} \\ &= \frac{\sin(4\pi B_0 t)}{4\pi B_0 t} \\ &= \text{sinc}(4B_0 t) \qquad (2)\end{aligned}$$

Accordingly, using Eq. (2) in (1), we get

$$p(t) = \frac{\text{sinc}(4B_0 t)}{1 - 16 B_0^2 t^2}$$

which is the desired result, except for the scaling factor $\sqrt{E}$.