Question #56912, Math / Calculus

please help me this question
http://i284.photobucket.com/albums/ll8/tan_pham1/cal_zpsljiej1vb.png

Integrate term by term the Fourier series expansion obtained in Example square wave

$$f(t) = \begin{cases} -1 & (-\pi < t < 0) \\ 1 & (0 < t < \pi) \end{cases}$$

$$f(t + 2\pi) = f(t)$$

Answer.

$\boldsymbol{f(t) = a_0 + \sum_{n=1}^{\infty}(a_n cosnt + b_n sinnt)}$ **where**

$$\boldsymbol{a_0 = \frac{1}{2\pi}\int_{-\pi}^{\pi} f(t)dt = \frac{1}{2\pi}[\int_{-\pi}^{0}(-1)dt + \int_{0}^{\pi} dt] = -\pi + \pi = 0;}$$

$$\boldsymbol{a_n = \frac{1}{\pi}\int_{-\pi}^{\pi} f(t)cosntdt = \frac{1}{\pi}[-\int_{-\pi}^{0} cosntdt + \int_{0}^{\pi} cosntdt] =}$$

$$\boldsymbol{= \frac{1}{\pi}\left[-\frac{1}{n}sin\pi n + \frac{1}{n}sin\pi n\right] = 0;}$$

$$\boldsymbol{b_n = \frac{1}{\pi}\int_{-\pi}^{\pi} f(t)sinntdt = \frac{1}{\pi}[-\int_{-\pi}^{0} sinntdt + \int_{0}^{\pi} sinntdt] =}$$

$$\boldsymbol{= \frac{2}{\pi n}(1 - cos\pi n) = \frac{2(1-(-1)^n)}{\pi n}.}$$

So $\boldsymbol{f(t) = \frac{2}{\pi}\sum_{n=1}^{\infty}\frac{1-(-1)^n}{n}sinnt.}$