Limit of sum of indicator function

[0] [1] jush
[2012-08-25 14:48:31]
[probability-theory limits]
[https://math.stackexchange.com/questions/186773/limit-of-sum-of-indicator-function]

I came across a problem involving the following limit:

$\lim_{n\to\infty}(\frac{1}{n}\sum_{i=1}^{n}\mathbf{1}_{x_i>0})$, where $X \sim N(\mu,\sigma)$

How would you approach evaluating the limit of this sum? I thought about applying some form of Riemann integral, but got stuck with the indicator function... Also, is it possible to say something about the distribution of the sum?

Thanks a lot!

(3) Can you interpret this limit as the probability of some event? (Hint: yes.) - **Michael Lugo**
This is actually part of the background to my question - the above is part of the broader problem. I've got an event which is determined by the sum $y_i \equiv k - c_i - \phi l$ being positive, where $C \sim N(\mu,\sigma)$ and k and l being constant. I want to express the probability of this event occuring depending on ϕ, which shifts the mean of the distribution of Y. From this, can I simply claim that $Y \sim N(\mu + k - \phi l, \sigma)$? As a more general question, would it make sense at all to look for a derivative of something like $Prob(Y) * m$, m being some constant? Thanks a lot! - **jush**
if the X_i are i.i.d, as I suppose the are, the summands are i.i.d random variables. use the SLLN - **mike**

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[0] [2012-09-23 12:53:54] Did [✔ACCEPTED]

One is considering $T_n = \frac{1}{n}\sum_{i=1}^{n} Y_i$, with $Y_i = \mathbf{1}_{X_i>0}$, for some random variables $(X_i)_i$. **If the random variables $(X_i)_i$ are i.i.d.**, the random variables $(Y_i)_i$ are, and the strong law of large numbers shows that $T_n \to \mathrm{E}(Y) = \mathrm{P}(X>0)$, almost surely and in every L^p for p finite.

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