1) False: $y = x^2$ has no fixed points on $(0,1)$, since $x \neq x^2$ is always on this set.

2) True: The derivative of the function $\log x$ is bounded on $\left(0.5, +\infty\right)$. So it is uniformly continious

3) True: Given any sequence $\left\{x_n + y_n\right\}$ on A+B we have:

$$x_n \xrightarrow[n\to\infty]{} x$$

$$y_n \xrightarrow[n\to\infty]{} y$$

$$\left|x_n + y_n - x - y\right| \leq \left|x_n - x\right| + \left|y_n - y\right| \xrightarrow[n\to\infty]{} 0$$

$$\lim\left(x_n + y_n\right) = x + y \in A + B$$

Thus, it is closed.

4) False: is quite easy to see that the function f(x) = sin(x^2) for x in R is bounded, continuous but not uniform continuous since [sqrt(Pi/2 + (k+1)Pi) - sqrt(Pi/2 + (k+1)Pi)] ->0 as k-> ∞

5) True: f_n are continious over closed interval, so they are uniformly bounded, and since they are all integrable, and their limit is too integrable, then we integral and limit sing commutes.