1. False. This function can only show that an improper integral is convergent. Otherwise, it is inconclusive.

2. False. The particular solution depends on the initial condition.

3. (a) Since $e^{x^2} > x^2$, then $\frac{1}{e^{x^2}} = e^{-x^2} < \frac{1}{x^2}$. By the comparison test, since $\int_1^\infty \frac{1}{x^2} dx$ converges, then so does $\int_1^\infty e^{-x^2} dx$.

   (b) i. $\frac{dT}{dx} = (A-T)^2$.

   ii. Isolate the variables: $\frac{dT}{(A-T)^2} = dx$

   Integrate both sides: $\frac{1}{A-T} = x + C$.

   Solve for T: $T(x) = A - \frac{1}{x+C}$

   Use initial conditions to find the value of C: $96 = T(0) = 75 - \frac{1}{0+C} \to C = \frac{-1}{21}$