Due: June 9th

1. Prove that $\lim\limits_{x\to 3} 10^{-1/(x-3)^2} = 0$ using the δ–ϵ definition.

2. Explain *exactly* what is meant by $\lim\limits_{x\to 0^+} (1 - e^{1/x}) = -\infty$.

3. For S a subset of $\mathbb{R}^n$, define $S^\perp = \{x \in \mathbb{R}^n : x \cdot s = 0 \text{ for all } s \in S\}$.

   (a) Show that $S^\perp$ is a subspace of $\mathbb{R}^n$.

   (b) Show that $S^\perp = (\mathrm{Span} S)^\perp$.

   (c) Show that $S \subseteq (S^\perp)^\perp$.

   (d) Show there is a nonempty set S with $S \neq (S^\perp)^\perp$.