This miniproject asks you to start thinking in terms of formal proofs and be able to spot errors in formal proofs.

Do the following problems.

(a) Give a formal proof for the Lewis Carroll argument in Example 26 of Section 1.3.

(b) Give a formal proof for the Lewis Carroll argument in Example 27 of Section 1.3.

(c) Find and explain all error(s) in the formal "proof" below, that attempts to show that if $\exists x A(x) \wedge \exists x B(x)$ is true, then $\exists x\,(A(x) \wedge B(x))$ is also true (which is not true).

	Step	Reason
(1)	$\exists x A(x) \wedge \exists x Q(x)$	premise
(2)	$\exists x A(x)$	simplification of (1)
(3)	$A(c)$	existential instantiation from (2)
(4)	$\exists x B(x)$	simplification of (1)
(5)	$B(c)$	existential instantiation from (4)
(6)	$A(c) \wedge B(c)$	conjunction from (3) and (5)
(7)	$\exists x\,(A(x) \wedge B(x))$	existential generalization

(d) Find and explain all error(s) in the formal "proof" below, that attempts to show that if $\forall x\,(A(x) \vee B(x))$ is true, then $\forall x A(x) \vee \forall x B(x)$ is also true (which is not true).

	Step	Reason
(1)	$\forall x\,(A(x) \vee B(x))$	premise
(2)	$A(c) \vee B(c)$	universal instantiation from (1)
(3)	$A(c)$	simplification from (2)
(4)	$B(c)$	simplification from (2)
(5)	$\forall x A(x)$	universal generalization from (3)
(6)	$\forall x B(x)$	universal generalization from (4)
(7)	$\forall x A(x) \vee \forall x B(x)$	conjunction from (5) and (6)