Comments from March 24 on Lesson HW 19.

What you were asked to prove:
\[ \forall y \in [3, 19], \exists x \in [-4, 2] \text{ such that } y = x^2 + 3. \]

\textit{A purely logical/algebraic statement; no functions involved.}

This is very different, logically, from
\[ \forall y \in [3, 19], \text{ if } \exists x \text{ such that } y = x^2 + 3, \text{ then } x \in [-4, 2] \]
and
\[ \forall y, \text{ if } \exists x \in [-4, 2] \text{ such that } y = x^2 + 3, \text{ then } y \in [3, 19] \]
\textit{Be sure to understand the difference; another (“real life”) example on next page.}

General form of original statement:
\[ \forall y \in A, \exists x \in B \text{ such that } y \text{ and } x \text{ have a happy relationship.} \]
\[ \forall y \in A, \exists x \in B \text{ such that } P(y, x). \]
\textit{Important that you know how to structure a proof of this.}

\textit{See notes from Jan. 29 on proving “there exists” and “for all ... , there exists ...”}
∀ y ∈ SciMajor, ∃ x ∈ GenEd such that y passes x.

∀ y ∈ SciMajor, if ∃ x such that y passes x, then x ∈ GenEd.

∀ y, if ∃ x ∈ GenEd such that y passes x, then y ∈ SciMajor.

SciMajor = set of students (at UA e.g.) who are science majors.

GenEd = set of General Education courses (if we’re talking about UA, then courses at UA)