**Educational challenge: Delivering a calculation-based tests remotely**

STEM and commerce disciplines assess in an ongoing basis learning outcomes related with the ability to solve, evaluate or even create original mathematical work by text or graphical interactions. However, achieving this goal fully online in a consistent and tailored digital assessment experience can be highly demanding. Examples of the required capabilities are delivering examinations with automatic marking of numerical calculations or algebraic expressions, set questions with smart randomisations, including adaptive feedback or multipart questions and combining several input types.

**Solution: STACK question type in Moodle quiz**

By using STACK in Moodle Quiz combined with our EDS consultation support, a written test can be enhanced in the online space with a sophisticated computer algebra system, enabling the following features:

**Students** can…
- Input mathematical expressions in any algebraically equivalent form of the right answer.
- Validate answers before submitting and get prompted or receive hints about incorrect syntax.
- Receive automatic feedback and partial marking according to specific answering conditions.

**Instructors** can…
- Assess advanced mathematical learning outcomes with automatically marked questions.
- Deploy several examination versions including graphical or equivalence reasoning approaches.
- Set complex question behaviours using pre-existent mathematical libraries.

**FAQ**

**How can I get started?**
- Please check the templates and guides section or contact us via the EDS consultation form for training and/or development.

**How can I assess if students have used an appropriate answering method?**
- STACK Potential Response Trees (PTRs) consist in a set of logical conditions that enable to mark students answers step-by-step (Multi-parts) and assign marks and feedback accordingly.

**How can I get the most of STACK?**
- This tool can be used for summative and formative tests, yielding well-known benefits from automated randomisations, scoring and feedback. However, effective learning through self-testing formative activities in multiple attempts has been shown to be one of the most successful approaches (adapted from Dunlosky et al. 2013).

**How are the mathematic expressions visualised?**
- STACK will render math expressions in LaTeX. Even special notations like actuarial work are supported.

---

**Support**

- For every question, the instructor should provide detailed information about the expected syntax and mathematical properties of correct answers, preventing student usability bias. This issue can be tackled by delivering STACK orientation questions or formative activities before any high-stake summative assessments in the course.
- Be consistent in notations or conventions in your STACK assessments will also help students to familiarise with the platform and how to input correct answer types.

**Templates/Guides**

1. STACK orientation question set
2. STACK introductory workshop (recorded)
3. Moodle question type selection chart

**Technical Considerations**

- STACK requires programming skills (maxima program language) compared with native Moodle question types.
- This tool is not centrally supported by UNSW Teaching Staff Gateway (ETS).