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Session Title: Sustainable open-source e-assessment in mathematics
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Summary: MathAssess, a JISC project, has developed a suite of specialist extensions for IMS QTI v2.1 which integrate with the specification and enable a range of computational, input and display features to be used for mathematical questions. Such questions are intrinsically portable between systems conforming to the QTI v2.1 standard, and merely require access to a small number of classes available via web services to perform the mathematical operations. The needs of mathematics go far beyond the obvious requirements for the rendering of properly formatted equations or unusual characters. In George Polya's famous words: "Solving problems is a practical art, like swimming or playing the piano; you can only learn it by imitation and practice". E-assessment systems for mathematics exploit the technology when they provide students with the opportunity to try each type of problem many times, which requires randomisable parameters in questions, response processing, judging and feedback. A further challenge to system design is enabling students to input well-formed mathematical expressions in answer to questions without the need for complex mark up. Finally, if $x-2$ is a correct answer to a problem so too is $-2+x$ or $-2(1-x/2)$ and numerous other variants so judging and feedback require algebraic processing.