24 Using Numbas As A Revision Tool For Mathematics Students

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Summary of Teaching Context

For the continuous assessment element of my courses, I use Moodle quizzes but to help students revise and practise the mathematical methodologies I have created Numbas quizzes.

Overview of the Strategy

'Numbas' is a free to use online assessment system developed by mathematicians at Newcastle University. In Moodle the "calculated question" allows you to generate a bank of questions testing the same methodology by inserting variables within the question design. This allows for randomised questions being offered to the students. The only drawback is that it can only accept a single response for each question. Numbas allows you to design questions using variables within the question text but can also allow for several questions/answers to be posed within the one question. The answers can be numerical or algebraic. Furthermore, it allows you to code in the general solution to the problem using variables which automatically change as the numbers change with each randomly generated version. This allows students to compare their worked solution to the "model solution" and pinpoint where they are going wrong. In this way it becomes a teaching and learning tool.

Once I complete a topic in class, I open the Numbas quizzes and for students to practice the methodologies as often as they wish.

Observations /Reflections

Student engagement is often related to the relative weight of the activity within the allocation of continuous assessment marks. I present the Numbas quizzes to the students as a voluntary activity. I have noticed that roughly 50% of my third-year students engage with these quizzes during the semester, normally in the week before a continuous assessment is due. Feedback from these students has been positive.

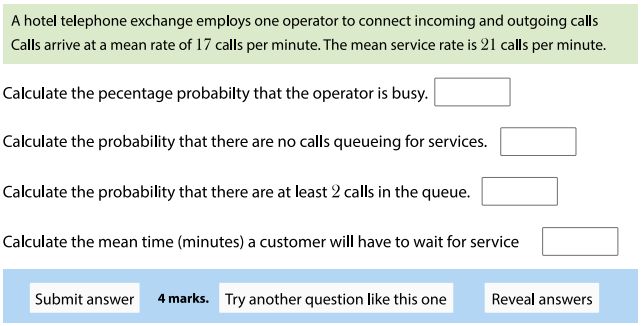
The quizzes can be created in Numbas and then exported to Moodle as a SCORM.

The main obstacle in implementing this as a strategy is the steep learning curve involved in writing questions using the software. A previous knowledge of LaTeX is helpful. However, users of the system are encouraged to share their questions and allow them to be freely used, copied or altered by others. So for the beginner there should be an ample selection to begin with.

Resources

https://www.numbas.org.uk/

Below is an example of a question from queueing theory, where the student inputs multiple answers



When the student clicks on the button "Reveal answers" they see the correct answers followed by the worked solution.

Advice

$\lambda = 17$ and $\mu = 21$

P(operator is busy) = 1 - P(no calls in the system)

$$= 1 - P_0$$
$$= 1 - \frac{\lambda}{\mu}$$
$$= 1 - 0.1904761905$$

Percentage probability = $0.8095238095 * 100\%$

$$= 80.9523809524\%$$

P(No calls in queue) = P(0 calls in system OR 1 call in the system)

$$= P_0 + P_1$$
$$= 0.1904761905 + 0.1541950113$$

P(at least n calls in queue = P(at least n+1 calls in the system)

$$= 1 - \text{P(less than n+1 calls in the system)}$$
$$= 1 - \{P_0 + P_1 + \ldots . P_n\}$$

The mean time a customer will wait for service = $W_Q = \frac{\lambda}{\mu\,\mu - \lambda}$