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Department of Mathematics

AcroTEX Bundle Test File

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Legend: In Section 5, a ✔ indicates that the student gave the correct response; a ✘, indicates an incorrect response, in this case, the correct answer is marked with a ●.

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1. Introduction

This is a sample file to give templates of the environments defined in `exerquiz`. The file illustrates the `exercise`, the `shortquiz` and `quiz` environments.

In the case of the quiz environments, only multiple-choice questions are illustrated. Open ended, or objective style questions are demonstrated in other sample files.

2. Online Exercises

A well-designed sequences of exercises can be of aid to the student. The `exercise` environment makes it easy to produce electronic exercises. By using the `forpaper` option, you can also make a paper version of your exercises. See the `Webeqman.pdf` reference manual.

EXERCISE 1. Evaluate the integral $\int x^2 e^{2x}\, dx$.

In the preamble of this document, we defined a `problem` environment with its own counter. Here is an example of it.

Problem 2.1. Is $F(t) = \sin(t)$ an antiderivative of $f(x) = \cos(x)$? Explain your reasoning.

Problem 2.2. Is $F(t) = \sin(t)$ an antiderivative of $f(x) = \cos(x)$? Explain your reasoning.

By modifying the `exercise` environment, you can also create an `example` environment. The one defined in the preamble of this document has no associated counter.

Example. Give an example of a set that is *clopen*.

Solution: The real number line is both closed and open in the usual topology of the real line. □

There is a `*`-option with the `exercise` environment, using it signals the presence of a multiple part exercise question. The following exercise illustrates this option.

EXERCISE 2. Suppose a particle is moving along the s-axis, and that its position at any time t is given by $s = t^2 - 5t + 1$.

(a) Find the velocity, v, of the particle at any time t.
(b) Find the acceleration, a, of the particle at any time t.

References can be made to a particular part of an exercise; for example, "see Exercise 2(a)." Part (a) is in blue; the solutions for that part is "hidden". This is a new option for the `exercise` environment.

There is now an option for listing multipart question in tabular form. This problem style does not obey the `solutionsafter` option.

EXERCISE 3. Simplify each of the following expressions in the complex number system. *Note*: $\bar{z}$ is the conjugate of z; $\operatorname{Re} z$ is the real part of z and $\operatorname{Im} z$ is the imaginary part of z.

(a) i^2 (b) i^3

(c) $z + \bar{z}$ (d) $1/z$

3. Short Quizzes with or without Solutions

Short quizzes are quizzes with immediate response. As soon as the user enters an answer, that answer is immediately evaluated, the results of the evaluation are communicated to the user.

Solutions can optionally be included in each question. Below is a `shortquiz` without solution.

Quiz Was it in Xanadu did Kubla Kahn a stately pleasure dome decree?

(a) True (b) False

Below is a `shortquiz` with a solution.

Quiz In what year did Columbus sail the ocean blue?

☐ 1490 ☐ 1491 ☐ 1492 ☐ 1493

These two types can be bundled together using the `questions` environment.

Quiz Answer each of the following. Passing is 100%.

1. Was it in Xanadu did Kubla Kahn a stately pleasure dome decree?

(a) True (b) False

2. In what year did Columbus sail the ocean blue?

(a) 1490 (b) 1491 (c) 1492 (d) 1493

Try using the `proofing` option of exerquiz. In this case, the correct answer is indicated to the side; useful, perhaps, for proof-reading the document

4. Graded Quizzes with JavaScript

You can create graded quizzes using the `quiz` environment. Here is a graded quiz using simple links. This might be suitable for a limited number of questions.

Begin Quiz Using the discriminant, $b^2 - 4ac$, respond to each of the following questions.

1. Is the quadratic polynomial $x^2 - 4x + 3$ irreducible?
   (a) Yes (b) No
2. Is the quadratic polynomial $2x^2 - 4x + 3$ irreducible?
   (a) Yes (b) No
3. How many solutions does the equation $2x^2 - 3x - 2 = 0$ have?
   (a) none (b) one (c) two

End Quiz Score:

By using the *-option, you can create a multiple choice set of question using check boxes.

Begin Quiz Using the discriminant, $b^2 - 4ac$, respond to each of the following questions.

1. Is the quadratic polynomial $x^2 - 4x + 3$ irreducible?
   ◯ Yes ◯ No
2. Is the quadratic polynomial $2x^2 - 4x + 3$ irreducible?
   ◯ Yes ◯ No

3. How many solutions does the equation $2x^2 - 3x - 2 = 0$ have?

◯ none ◯ one ◯ two

End Quiz Score:

The `proofing` option of exerquiz can be used to mark the correct answer to the side; useful, perhaps, for proof-reading the document

5. Correcting Quizzes with JavaScript

Beginning with version 1.2 of exerquiz, you can now grade the quizzes created by the `quiz` environment. In this section, we illustrate the `quiz` environment with corrections.

There are two types: link-style and form-style. This is the link-style format:

Begin Quiz Answer each of the following. Passing is 100%.

1. Who created TEX?

(a) Knuth (b) Lamport (c) Carlisle (d) Rahtz

2. Who originally wrote LATEX?

(a) Knuth (b) Lamport (c) Carlisle (d) Rahtz

End Quiz Score: Correct

We can obtain the forms-style quiz simply by inserting an * before the quiz field name. Important! Be sure to name each quiz field differently!

Begin Quiz Answer each of the following. Passing is 100%.

1. Who created TEX?

○ Knuth ○ Lamport ○ Carlisle ○ Rahtz

2. Who originally wrote LATEX?

○ Knuth ○ Lamport ○ Carlisle ○ Rahtz

End Quiz Score: Correct

The "corrections" button can be modified to fit your needs. The quiz below queries your knowledge of the people who maintain various freeware TEX Systems.[1] The corrections button has been modified to take on a different look.

Begin Quiz Answer each of the following. Passing is 100%.

1. What TEX System does Thomas Esser maintain?

○ MikTEX ○ csTEX ○ teTEX ○ fpTEX

[1] This quiz is a bit out of date.

2. What TEX System does Fabrice Popineau maintain?

○ MikTEX ○ csTEX ○ teTEX ○ fpTEX

3. What TEX System does Christian Schenk maintain?

○ MikTEX ○ csTEX ○ teTEX ○ fpTEX

End Quiz Score: TeX

6. Objective-Style Questions

It is possible to pose objective-style questions (fill-in-the-blank). The demo file for this style question is called jquiztst.pdf (relative link: jquiztst.pdf). Click on the link to review this demo file.

Solutions to Exercises

Exercise 1. We evaluate by `integration by parts`:

$$\begin{aligned}
\int x^2 e^{2x}\,dx &= \tfrac{1}{2}x^2e^{2x} - \int xe^{2x}\,dx && u = x^2,\ dv = e^{2x}\,dx \\
&= \tfrac{1}{2}x^2e^{2x} - \left[\tfrac{1}{2}xe^{2x} - \int \tfrac{1}{2}e^{2x}\,dx\right] && \text{integration by parts} \\
&= \tfrac{1}{2}x^2e^{2x} - \tfrac{1}{2}xe^{2x} + \tfrac{1}{2}\int e^{2x}\,dx && u = x^2,\ dv = e^{2x}\,dx \\
&= \tfrac{1}{2}x^2e^{2x} - \tfrac{1}{2}xe^{2x} + \tfrac{1}{4}e^{2x} && \text{integration by parts} \\
&= \tfrac{1}{4}(2x^2 - 2x + 1)e^{2x} && \text{simplify!}
\end{aligned}$$

Exercise 1

Problem 2.1. The answer is yes. The definition states that F is an antiderivative of f if $F'(x) = f(x)$. Note that

$$F(t) = \sin(t) \implies F'(t) = \cos(t)$$

hence, $F(x) = \cos(x) = f(x)$. ◀

Problem 2.2. The answer is yes. The definition states that F is an antiderivative of f if $F'(x) = f(x)$. Note that

$$F(t) = \sin(t) \implies F'(t) = \cos(t)$$

hence, $F(x) = \cos(x) = f(x)$. ◀

Exercise 2(b) Acceleration is the rate of change of velocity with respect to time. Thus,

$$a = \frac{dv}{dt}$$

For our problem, we have

$$a = \frac{dv}{dt} = \frac{d}{dt}(2t - 5) = 2.$$

The acceleration at time t is constant: $\boxed{a = 2}$. □

Exercise 3(a) $i^2 = -1$ □

Exercise 3(b) $i^3 = ii^2 = -i$ □

Exercise 3(c) $z + \bar{z} = \operatorname{Re} z$ □

Solutions to Quizzes

Solution to Quiz:

In 1492,
Columbus sailed the ocean blue.

Profound was the logic in his quest,
to get to the east, he headed west.[2]

[2]This poem was obtained by personal communication from Leonard A. Stefanski, Department of Statistics, North Carolina State University.

Solution to Quiz:

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[3]This poem was obtained by personal communication from Leonard A. Stefanski, Department of Statistics, North Carolina State University.

Solution to Quiz: Yes, it was Donald Knuth who first created TEX.

Solution to Quiz: Yes, it was Leslie Lamport who first created TEX.