Example Exam Solutions

This text will only be printed if solutions are being printed. It might include general instructions for graders.

Question	Points	Score
Basic question with no parts	4	
Basic question with parts	5	
Question with a solution	2	
Including R code	3	
Question with math	3	
Question with parts and solutions	5	
Question with subparts and subsubparts	12	
Multiple choice question	1	
True/False questions	3	
Multiple choice questions with multiple columns	0	
Cough Syrup	5	
Total:	43	

Basic Questions

1. *Basic question with no parts* (4 points in total)
This demonstrates a simple question with a title. It has been assigned 4 points.

2. *Basic question with parts* (5 points in total)
This demonstrates a question with parts. Here, we will assign the points to the parts, and LaTeX will then automatically calculate the total number of points for the question. (The same works for subparts and subsubparts!)

 (a) (3 points) This is the first part, worth 3 points.

 (b) (2 points) This is the second part, worth 2 points.

Including solutions and leaving space for answers

You can include solutions to questions or parts by using the 'solution' environment.

To print the solutions, render the document with the examclass-pdf+solutions format option.

If you include an optional space parameter when you write a solution, LaTeX will automatically leave that amount of blank space after the question when solutions are *not* being printed. This is useful if you want to leave space for students to write their answers.
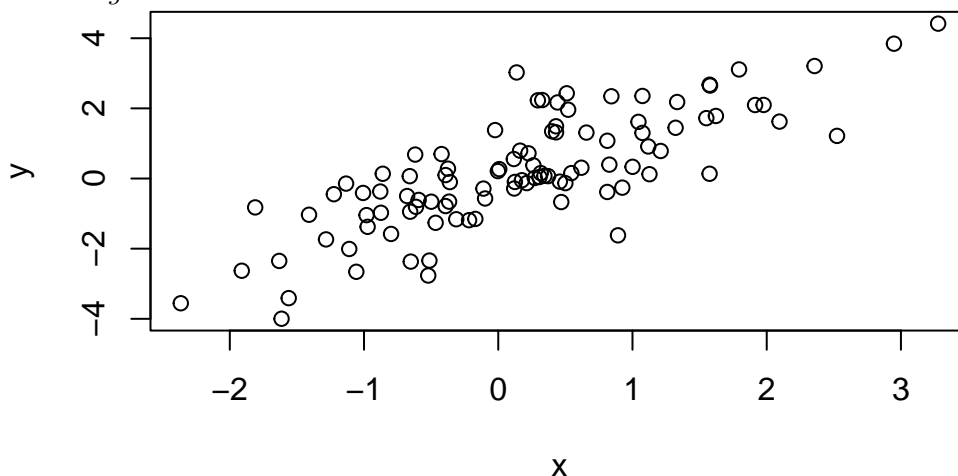
3. *Question with a solution* (2 points in total)
This is a simple question worth 2 points. There are two inches of space after this question when solutions are not being printed.

> **Solution:** This is how you include a solution for a question. It will only appear when answers are printed.

RMarkdown

You can include R code in your exam and solutions.

4. *Including R code* (3 points in total)

Estimate the mean of x.

> **Solution:** We can find the mean of `x` using the `mean` function.
>
> ```r
> mean(x)
> ```
>
> ```
> [1] 0.177514
> ```

Math

You can include math in your exam and solutions using LaTeX syntax.

5. *Question with math* (3 points in total)
   What is the value of $\int_{\pi/2}^{\pi} \frac{1}{x^2} dx$?

> **Solution:** We can find the value of this integral using the `integrate` function.
>
> ```r
> integrate(function(x) 1/(x^2), pi/2, pi)
> ```
>
> ```
> 0.3183099 with absolute error < 3.5e-15
> ```

Question parts

6. *Question with parts and solutions* (5 points in total)
   You can add parts to a question using the `parts` environment. If you assign points to the parts, the total number of points for the question will be calculated automatically.

   You can add solutions to the individual parts of a question.

   (a) (2 points) This is the first part .

   > **Solution:** This is the solution to the first part.

   (b) (3 points) This is the second part.

   > **Solution:** This is the solution to the second part.

7. *Question with subparts and subsubparts* (12 points in total)
   Questions can have subparts and subsubparts.

   (a) (2 points) This is a part without any subparts.

   (b) This is a part with subparts.

      i. (2 points) This is a subpart.

      ii. (3 points) This is another subpart.

         α) (3 points) This is a subsubpart.

         β) (2 points) This is another subsubpart.

Standard Exam Class Question Types

8. *Multiple choice question*   (1 points in total)

We can include multiple choice questions with the `choices` environment. The correct answer can be specified with the `\CorrectChoice` command, and it will be highlighted when answers are printed.

☐ This one

☐ That one

■ **This correct one**

☐ Another one

> **Solution:** If we want to provide more to the solutions than simply stating the correct choice, we can still do that.

Additional Question Types included with Quarto Exam Class

These question types are defined in the 'examadditions.sty' file, which is added to your directory automatically when you render a document using the Quarto Exam Class template.

9. *True/False questions*   (3 points in total)

You can easily add true/false questions to your exam. For each item, you'll give the statement and whether it is true or false. The correct answers will show up when solutions are printed.

	True	False
This statement should be true	■	☐
This statement should be false	☐	☐

10. *Multiple choice questions with multiple columns*   (0 points in total)

You can include multiple choice questions with the `multicolcheckboxes` environment.

☐ This is a choice   ☐ This is yet another choice

■ **This is another choice**

Including other files

You can include other LaTeX files in your exam using the standard LaTeX `include` command, or other Quarto files using Quarto's `include` shortcode.

11. *Cough Syrup*   (5 points in total)

A random sample of 50 bottles of a particular brand of cough syrup is selected and the alcohol content (in milligram) of each bottle is determined. Let μ denote the average alcohol content for the population of all bottles of the brand. Suppose that the resulting 95% confidence interval for μ is $(7.8, 9.4)$.

Select all the TRUE statements below.

☐ 95% of the bottles of this type of cough syrup have an alcohol content from 7.8 to 9.4 milligrams.

☐ There is a 95% chance that μ is between 7.8 and 9.4 milligrams.

☐ We can be highly confident that 95% of all bottles of this type of cough syrup have an alcohol content that is between 7.8 and 9.4 milligrams.

■ **If we repeat the process of selecting a sample of size** 50 **bottles and then computing the corresponding 95% confidence intervals for many times, then 95% of the resulting intervals will include μ.**

■ **If we increase the confidence level to 99%, the confidence interval will be wider.**

☐ The 95% confidence interval is NOT valid as the population distribution of the alcohol content may not be normal.

☐ If we repeat the process of selecting a sample of size 50 bottles and then computing the average alcohol content of the selected 50 bottles, 95% of these sample means will be between 7.8 and 9.4.

☐ If we test the null hypothesis that the average alcohol content of this type of cough syrup is 8 milligrams, the two-sided p-value will be below 0.05 and we will reject the null hypothesis.

■ **The margin of error for the 95% confidence interval (7.8, 9.4) is 0.8.**

☐ We can reduce the margin of error by half if we double the sample size.