

Free Response Question (FRQ) Packet: Sample & Instructions

SAMPLE:

Consider the curve $y^2 = 4 + x$ and chord AB joining points $A(-4, 0)$ and $B(0, 2)$ on the curve.
(a) Find the x - and y -coordinate of the point on the curve where the tangent line is parallel to chord AB .

REMINDER: Guidelines for Preparation of Free-Response Question (FRQ) Assignments

FRQ assignments **must** adhere to the following instructions (all other homework assignments are more flexible in format). These instructions are intended to provide you with some basic guidelines to creating organized, legible, and professional-looking homework.

Paper:

- Use standard size (8 ½" by 11") paper (not tracing paper, colored paper, sheets from a spiral notebook, or the back side of previously used paper).
- Emphasis is on readability and accuracy. Use a pencil. Do not cross out errors; erase them.
- It is not necessary to include every detail of a problem solution, but enough details, steps, and words must be included so that the logic is clear and someone else can readily check the problem solution.

Format:

- Make each problem self-contained. Start each new problem on a new page. A page is one side of a sheet of paper. It is acceptable to place more than one problem on a sheet (one on the front, one on the back).
- Label each problem separately. The problem packet and number should precede your work on the line above where your work begins. (Example: "FRQ 1 P1" represents FRQ Packet #1, Problem 1). Working below the printed problem is preferred.

Each problem:

- Write down equations to be used in generic form before expanding them into problem specific form.
- Draw a diagram whenever appropriate. This is MANDATORY.
- Indicate the method of solution, any assumptions or approximations made, and justify your answer where appropriate or required.
- Identify answers clearly. Remember that an answer is not complete without expressing the appropriate units.
- All decimal answers must be correct to three decimal places.

Turn in:

- Arrange the homework sheets in proper order.
- Staple the assignments in the upper left-hand corner making sure that no part of any problem identification or solutions is covered by the staple.
- Turn in assignments by the beginning of class on the indicated due date.

Attitude:

The goal of performing the FRQ assignment is to arrive at a solution by a method that makes sense to YOU, not to invent a method which produces the correct answer. Evaluation of the assignment is to ensure that your method is in accordance with the theory and practice presented in class, and to provide appropriate guidance when it is not the case.

Discussions, comparisons, and validations of methods between students or study groups are acceptable and often helpful. However, each individual's submission is expected to represent his or her own personal level of understanding of the particular topic. Copying or duplication of another's work and submitting it as your own or silently condoning such practice defeats the educational purpose of FRQ assignments and constitutes violation of academic integrity standards. Such violations will generally result in a zero on the suspect submission (for both the copier and the copied) and can (in extreme or repeated cases) result in failure of the course because of "zero" grades.

Deviation from the above requirements will make the submitted assignment unacceptable and it may be assigned a grade of zero. Unprofessional or unreadable homework will not be graded and may also receive a grade of zero. No late FRQ assignments will be accepted. Field trips or other pre-arranged absences will *not* be excuses for late FRQ's.

SAMPLE:

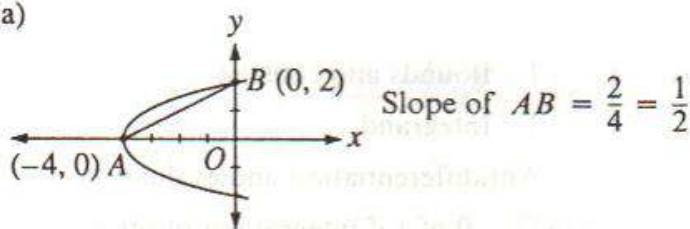
Consider the curve $y^2 = 4 + x$ and chord AB joining points $A(-4, 0)$ and $B(0, 2)$ on the curve.

- (a) Find the x - and y -coordinate of the point on the curve where the tangent line is parallel to chord AB .

SOLUTION from College Board:*Solution**Scoring Scale*

(a)

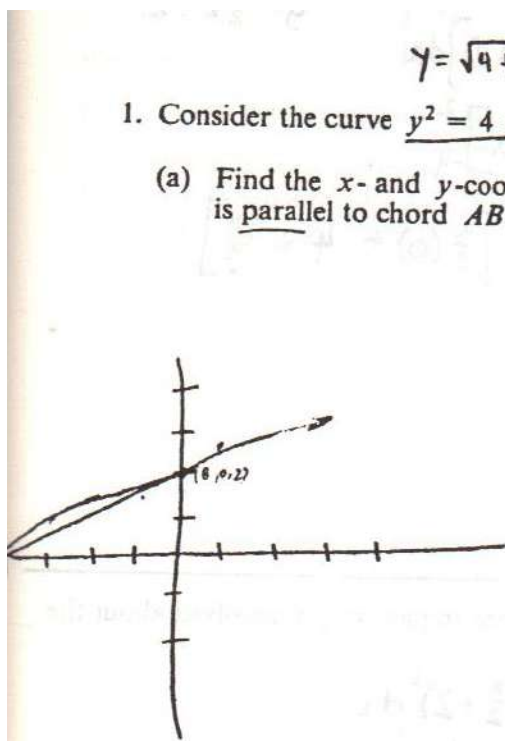
Points



Method 1: $y = \sqrt{4 + x}; \frac{dy}{dx} = \frac{1}{2\sqrt{4 + x}};$
 $\frac{1}{2\sqrt{4 + x}} = \frac{1}{2}, \text{ so } x = -3,$
 $y = 1$

- 1: Differentiation
 1: Sets student's derivative
 = student's slope of chord AB
 1: Answer

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SOLUTION from Student Work:

$$y = \sqrt{4 + x}$$

1. Consider the curve $y^2 = 4 + x$ and chord AB joining points $A(-4, 0)$ and $B(0, 2)$ on the curve.

- (a) Find the x - and y -coordinates of the point on the curve where the tangent line is parallel to chord AB .

$$y = (4 + x)^{\frac{1}{2}}$$

$$m_{\text{curve}} = y' = \frac{1}{2}(4 + x)^{-\frac{1}{2}}$$

$$m_{AB} = \frac{2 - 0}{0 - (-4)} = \frac{2}{4} = \frac{1}{2}$$

parallel slopes $\rightarrow m_{\text{curve}} = m_{AB}$

$$\frac{1}{2\sqrt{4 + x}} = \frac{1}{2}$$

$$(4 + x)^{\frac{1}{2}} = 1$$

$$x = -3, y = 1$$

$$\underline{(-3, 1)}$$