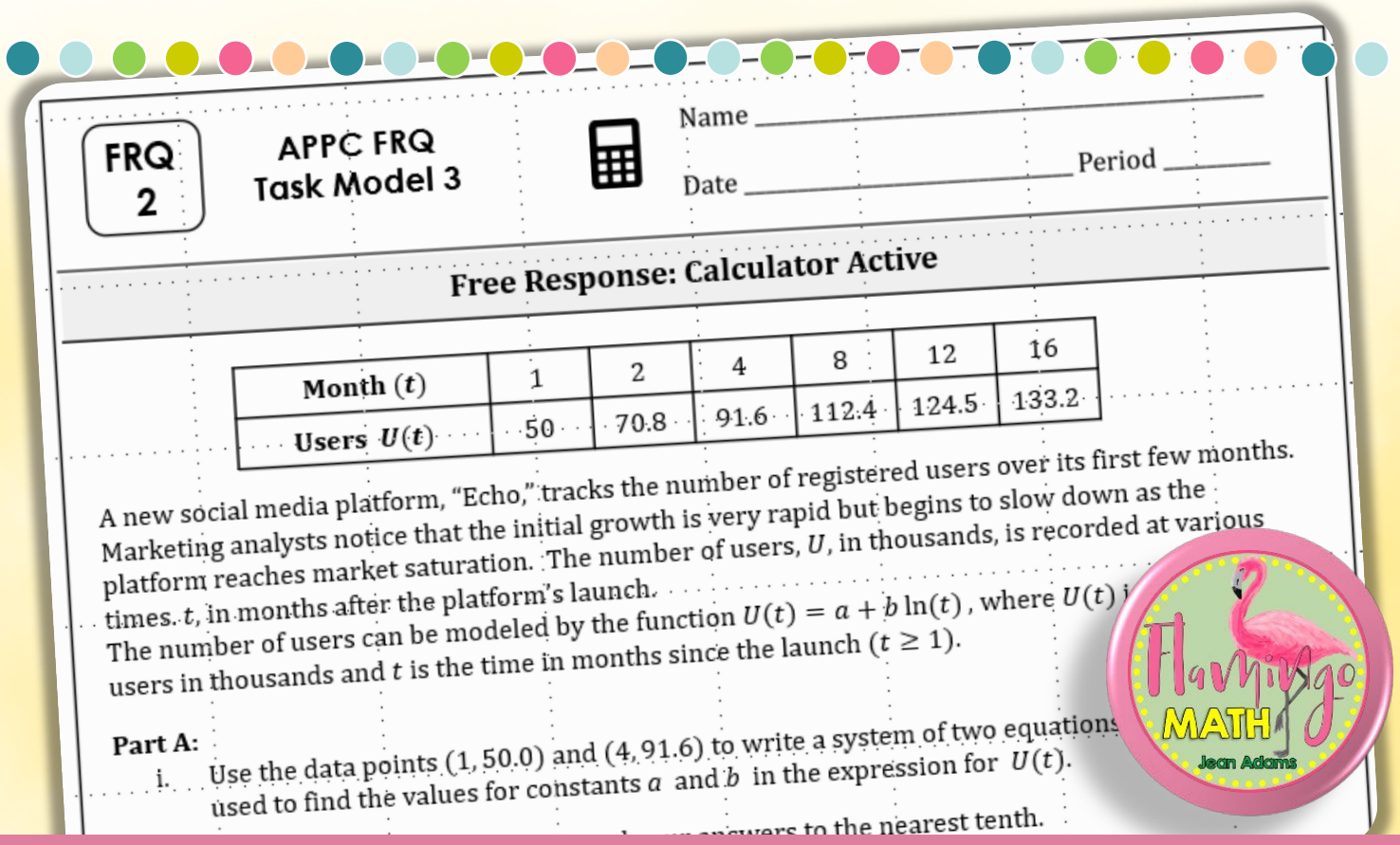
AP® Precalculus

Modeling Non-Periodic More Task Models



FRQ 2

APPC FRQ
Task Model 3

Name _____

Date _____ Period _____

Free Response: Calculator Active

Month (t)	1	2	4	8	12	16
Users $U(t)$	50	70.8	91.6	112.4	124.5	133.2

A new social media platform, "Echo," tracks the number of registered users over its first few months. Marketing analysts notice that the initial growth is very rapid but begins to slow down as the platform reaches market saturation. The number of users, U, in thousands, is recorded at various times, t, in months after the platform's launch.

The number of users can be modeled by the function $U(t) = a + b\ln(t)$, where $U(t)$ i
users in thousands and t is the time in months since the launch ($t \geq 1$).

Part A:

i. Use the data points $(1, 50.0)$ and $(4, 91.6)$ to write a system of two equations
used to find the values for constants a and b in the expression for $U(t)$.

nswers to the nearest tenth.

Flamingo MATH
Jean Adams

Free Response Question #2

Modeling a Non-Periodic Function FRQ #2 Set

KEY CONCEPTS/TOPICS:

This task model may include polynomial (mostly linear and quadratic, possibly cubic), piecewise-defined, exponential, and logarithmic functions. This question presents a real-life context ***and will be a word problem.***

About The Product

Free Response Set

This set of five free response questions is designed for AP Precalculus students to practice **Modeling a Non-Periodic Function covered in Units 1 and 2 for the AP Exam.**

Using the problem set:

You can use the set as a review for the AP Exam after units 1 and 2 are completed. Each FRQ is designed to be done with a calculator to model the requirements for the AP Exam.

Preparation

1. Copy an FRQ prompt for each student.
2. Have students work the problem set with a calculator or Desmos.
3. Grade on a 6-point scale, included in the key to match the AP Precalculus Exam.
4. A Calculator "Cheat Sheet" with helpful tips is also provided.

© Jean Adams. All Rights Reserved. www.Flamingo Math.com

Product Pages

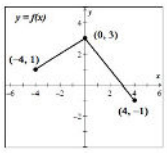
www.FlamingoMath.com

FRQ 1 — APPC FRQ Task Model 1

Name _____ Date _____ Period _____

Free Response: Calculator Active

The figure shows the graph of the function f on its domain $[-4, 4]$. The points $(-4, 1)$, $(0, 3)$, and $(4, -1)$ are on the graph of f.
The function g is given by $g(x) = 4(0.5)^x - 3$



Part A: The function h is defined by $h(x) = (g \circ f)(x) = g(f(x))$.
i. Find the value of $h(-4)$ as a decimal approximation or indicate that it is not defined. Show the work that leads to your answer.
ii. Find the values of $f^{-1}(1)$ or indicate that it is not defined.

Part B:
i. Find all the values of x for which $g(x) = -5$ or indicate there are no such values.
ii. Determine the end behavior of g as x increases without bound. Express your answer using the mathematical notation of a limit.

Part C:
i. Determine if f has an inverse function.
ii. Give a reason for your answer based on the definition of a function and the graph of $y = f(x)$. Refer to values from the graph in your reasoning.

© 2026 Jean Adams Flamingo Math.com

FRQ 1 — APPC FRQ Task Model 2

Name _____ Date _____ Period _____

Free Response: Calculator Active

Let f be a function defined for all real numbers. The table below gives values of $f(x)$ for selected values of x. The function g is given by the equation $g(x) = \log_2(x + 5) - 2$.

x	−2	−1	0	1	2	3	4
$f(x)$	10	5	2	1	2	5	10

Part A: The function h is defined by $h(x) = (g \circ f)(x) = g(f(x))$. Find the value of $h(1)$ as a decimal approximation or indicate that it is not defined.
ii. Find the values of $f^{-1}(5)$ or indicate it is not defined.

Part B:
i. Find all values of x as decimal approximations for which $g(x) = 1.5$ or indicate there are no such values. Show your work that leads to your answer.
ii. Determine the end behavior of $g(x)$ as you approach the asymptote from the right side. Express your answer using the mathematical notation of a limit.

Part C: ... of values to determine whether $f(x)$ is best modeled by a linear, quadratic, exponential, or logarithmic function. Explain how for your answer, based on the relationship between each pair of the change in input values of f. Refer to values in your reasoning.

Flamingo Math.com

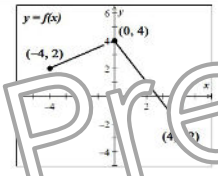
FRQ 1 — APPC FRQ Task Model 5

Name _____ Date _____ Period _____

Free Response: Calculator Active

The function f is a piecewise –linear function, shown at right, defined on the closed interval $[-4, 4]$.
The function g is an invertible function. Selected values of g are given in the table below.

x	−1	0	1	2
$g(x)$	0.5	1	2	4



The function h is a logarithmic function defined by $h(x) = 2\ln(x + 3)$.

Part A: Evaluate $h(4)$.
ii. Find the value of $h(g(0))$.

Part B:
i. Determine the x-intercept of the function h.
ii. Identify the end behavior of h as $x \to -3$ from the right. Express your answer using limit notation.

Part C: A student claims that the function g could be modeled by a linear function because the output values are increasing.
i. Is the student's reasoning correct?
ii. **Give a reason** based on concepts to support your answer. Use the specific values provided in the table to justify why g is or is not linear.

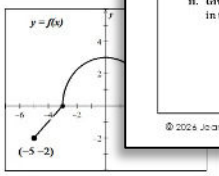
© 2026 Jean Adams Flamingo Math.com

FRQ 1 — APPC FRQ Task Model 3

Name _____ Date _____

Free Response: Calculator Active

The figure shows the graph of the function f on its domain $[-5, 5]$. Consists of a semi-circle Centered at $(0, 0)$ from $x = -3$ to $x = 3$ (where $y \geq 0$), and two line segments.



The function g is given by

$$g(x) = \frac{10}{1 + e^{-x}}$$

Part A:
i. The function h is defined by $h(x) = (g \circ f)(x) = g(f(x))$. Find the value of $h(0)$ as a decimal approximation or indicate that it is not defined. Show the work that leads to your answer.
ii. Find all x such that $f(x) = 0$.

Part B:
i. Find all values of x as decimal approximations for which $g(x) = 8$ or indicate there no such values.
Determine the end behavior of $g(x)$ as x decreases without bound. Express your answer using the mathematical notation

Part C:
i. Determine if f is invertible on its domain. Give a reason for your answer based on the definition of a function and the graph of $y = f(x)$. Refer to values from the graph in your reasoning.
ii. If the domain of f were restricted to $[0, 3]$, would it be invertible? Explain.

© 2026 Jean Adams Flamingo Math.com

APPC FRQ Task Model 4

Name _____ Date _____ Period _____

Free Response: Calculator Active

defined by $g(x) = 3\ln(x + 2)$ ... on f ... exponential ... on $-ab^x$. The table ... gives ... of $f(x)$ ... selected ... of x.

x			1	2	3
$f(x)$	6				2

... h is defined by $h(x) = (g \circ f)(x) = g(f(x))$. Find the value of $h(3)$ as ... approximation or indicate that it is not defined. Show the work that leads ... answer.
ii. Find the value of $f^{-1}(0.5)$

Part B:
i. Find all the values of x as decimal approximations for which $g(x) = 5$ or indicate there are no such values.
ii. Determine the end behavior of $g(x)$ as x approaches its vertical asymptote from the right side. Express your answer using the mathematical notation of a limit.

Part C:
i. Use the table of values to determine an exponential equation for $f(x)$.
ii. Give a reason for your answer based on the relationship between the change in values of f and the change in input values of f. Refer to the values in the ... reasoning.

© 2026 Jean Adams Flamingo Math.com

Preview Preview Preview Preview Preview Preview