# AP Precalculus FRQ #1 Key 2025

A (i) $h(x) = g(f(x))$

$h(1) = g(f(1)) = 1.75$

$h(1) = g(1.75) = -0.167(1.75)^3 + (1.75)^2 - 1.834$

$\underline{h(1) = 0.3334}$

(ii) $f^{-1}(3.5) = 0$

B(i) $g(x) = 0$

$x = -1.233,\ x = 1.578,\ x = 5.643$

(ii) $\lim_{x \to \infty} g(x) = -\infty$

C(i) The best model for function f is exponential.

(ii) The output values of f(x) change proportionally by a factor of ½ over equal length input-value intervals.

# AP Precalculus FRQ #2 Key — 2025

A(i) $D(t) = at^2 + bt + c$

$D(0) = 25 = 0^2 \cdot a + 0 \cdot b + c \Rightarrow c = 25$

$D(2) = 30 = 2^2 a + 2b + c \Rightarrow 4a + 2b + 25 = 30$

$D(4) = 34 = 4^2 a + 4b + c \Rightarrow 16a + 4b + 25 = 34$

(ii) $a = -0.125$

$b = 2.75$

$c = 25$

B(i) $AROC = \dfrac{D(4) - D(0)}{4 - 0} = \dfrac{34 - 25}{4 - 0} = \dfrac{9}{4} = 2.25$ thousand plays per month

(ii) At $t = 1.5$ months

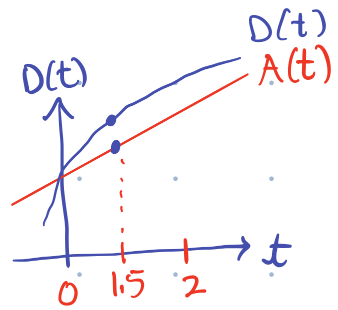
$D(0) = 25 \qquad D(1.5) = ?$

$A(t) = mt + b$

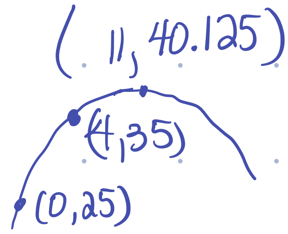
$A(t) = 2.25t + 25$

$A(1.5) = 2.25(1.5) + 25 = \underline{\underline{28.375}}$ thousand plays

(iii) $A_{1.5} < D(1.5)$, since $D(t)$ is increasing at a decreasing rate and is concave down. On the interval of $0 < t < 4$, the secant line $A(t)$ lies below the curve of $D(t)$.



APPC FRQ #2 Key (cont.)




c. $D(t) = -0.125t^2 + 2.75t + 25$

$D(0) = 25$ minimum of D

$D(11) = 40.125$ maximum of D

Since D(t) is concave down a maximum value is attained at $t = 11$. The number of plays will not decrease, so domain restrictions for the boundary of D should be $0 \le t \le 11$ months.

# AP Precalculus FRQ#3 Key 2025

A. Points

F $(0, 2)$

G $(\frac{1}{800}, 0)$

J $(\frac{1}{400}, -2)$

K $(\frac{3}{800}, 0)$

P $(\frac{1}{200}, 2)$

not unique answers

$h(t) = 2\sin\left[400\pi\left(t + \frac{1}{800}\right)\right]$

$h(t) = 2\sin\left[400\pi\left(t - \frac{3}{800}\right)\right]$

B) $a = 2$

$b = 400\pi$

$c = \frac{1}{800}$ or $-\frac{3}{800}$

$d = 0$

$h(t) = 2\sin[400\pi(t+c)]$

$2\sin[400\pi(0+c)] = 2$

$\sin[400\pi c] = 1$

$400\pi c = \frac{\pi}{2}$

$c = \frac{1}{800}$

C (i) On $(t_1, t_2)$ h is negative and decreasing

(ii) On interval (G,J) $(t_1, t_2)$ the graph of h is concave up and the rate of change of h is negative and increasing.

# AP Precalculus FRQ#4 Key 2025

A (i.) $g(x) = 2\log_3 x$ $\quad x > 0$

$2\log_3 x = 4$

$\log_3 x = 2$

$\underline{\underline{x = 9}}$

(ii) $h(x) = 4\cos^2 x$ $\quad [0, \pi/2]$

$4\cos^2 x = 3$

$\cos^2 x = \frac{3}{4}$

$\cos x = \frac{\sqrt{3}}{2}$

$\underline{\underline{x = \pi/6}}$

B (i) $j(x) = \log_2 x + 3\log_2 2$

$= \log_2 x + \log_2 8$

$= \underline{\underline{\log_2(8x)}}$

(ii) $k(x) = \dfrac{6}{\tan x(\csc^2 x - 1)} = \dfrac{6}{\tan x(\cot^2 x)}$

$= \dfrac{6 \cdot \tan^2 x}{\tan x} = \underline{\underline{6\tan x}}$

C. $m(x) = e^{2x} - e^x - 12$

$e^{2x} - e^x - 12 = 0$

$(e^x - 4)(e^x + 3) = 0$

see right

$e^x - 4 = 0$ $\quad e^x + 3 = 0$

$e^x = 4$ $\quad e^x = -3$

$x = \ln 4$ $\quad x \neq \ln(-3)$

$\underline{\underline{x = 2\ln 2}}$