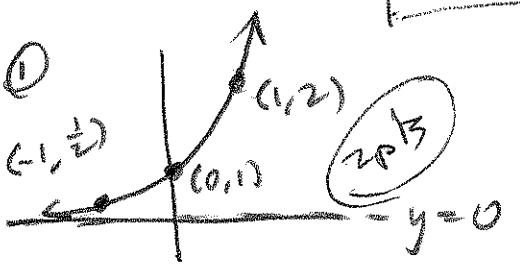
121 - G11 Q9 Q4

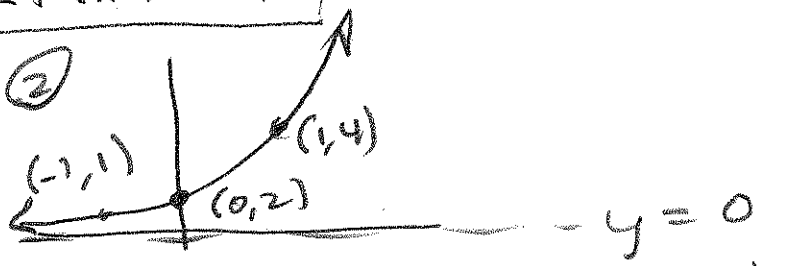
#1 $2 \cdot 2^{x-1} - 4 = g(x)$ — 2pts

$f(x) = 2^x \longrightarrow$ **$g(x) = 2f(x-1) - 4$** — 2pts

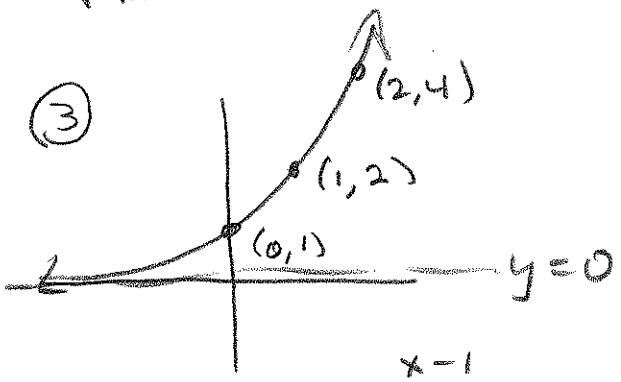
① 

2pts

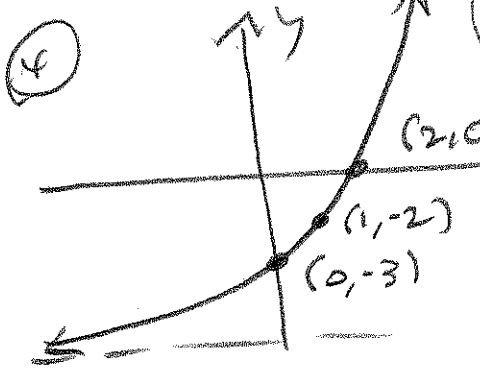
$f(x) = 2^x$

② 

$2f(x) = 2 \cdot 2^x$

③ 

$2f(x-1) = 2 \cdot 2^{x-1}$

④ 

3pts — Must follow from 1st 3 pts

$2 \cdot f(x-1) - 4 = 2 \cdot 2^{x-1} - 4 = g(x)$

#2 $2 \cdot 3^{y+2} - 7 = x$

$2 \cdot 3^{y+2} = x + 7$

$3^{y+2} = \frac{x+7}{2}$ — 5pts

$y + 2 = \log_3\left(\frac{x+7}{2}\right)$

$y = \log_3\left(\frac{x+7}{2}\right) - 2$

$= f^{-1}(x)$, if

$f(x) = 2 \cdot 3^{x+2} - 7$

#3 $A = Pe^{kt}$ di $\frac{1}{2}$-life ≈ 5800 yrs

$\Rightarrow Pe^{5800k} = \frac{1}{2}P$ — 2pts

$\Rightarrow e^{5800k} = \frac{1}{2}$

$\Rightarrow 5800k = \ln\left(\frac{1}{2}\right) = -\ln(2)$

$\Rightarrow k = \frac{-\ln(2)}{5800}$ — 3pts. Now,

If 15% remains, then

$Pe^{kt} = .15P$

$e^{kt} = .15$

$kt = \ln(.15)$

$t = \frac{\ln(.15)}{k} = \frac{\ln(.15)}{-\ln(2)}(5800) \approx$ **15,874 yrs old** — 3pts

#4 $A(t) = 40000e^{.04t}$ — 5pts

$\Rightarrow A(15) = 40000e^{.04(15)}$

$\approx$ **40,956 people in 5 yrs**

Alternate #4

$A = P(1+r)^t$

$= 40000(1+.04)^5$

$\approx 48,666$ people