(1) (a) $A(t) = \boxed{\left(\frac{1}{2}\right)^{t/5700}}$.

(b) $.29 = \left(\frac{1}{2}\right)^{t/5700} \Rightarrow \ln(.29) = \frac{t}{5700}\ln\left(\frac{1}{2}\right)$

$\Rightarrow t = \dfrac{5700\ln(.29)}{\ln(.5)} \approx \boxed{10179 \text{ years.}}$

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(2) x^2-kx+4 must have $x-1$ as a factor. Doing the division, we have

$$\begin{array}{r|l} & x+(1-k) \\ x-1 & x^2-kx+4 \\ & x^2 - x \\ \hline & (1-k)x+4 \\ & (1-k)x-(1-k) \\ \hline & 4+1-k \end{array}$$

Thus, we must have $4+1-k=0 \Rightarrow \boxed{k=5}$.

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(3) (a) The velocity is $y'(t) = -2\pi\omega y_0 \sin(2\pi\omega t)$, while the acceleration is $y''(t) = -(2\pi\omega)^2 y_0 \cos(2\pi\omega t)$

(b) $y''(t)+4\pi^2\omega^2 y(t) = -(4\pi^2\omega^2)y_0\cos(2\pi\omega t) + 4\pi^2\omega^2 y_0 \cos(2\pi\omega t)$
$= 0.$

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(4) The volume of the cell is $V(t) = \frac{4}{3}\pi r(t)^3$.

Thus $\dfrac{dV}{dt} = \dfrac{dV}{dr}\dfrac{dr}{dt} = 4\pi r(t)^2 \dfrac{dr}{dt}$.

We are given $\dfrac{dV}{dt} = 400$, and $r(t) = 10$.

Thus, $\dfrac{dr}{dt} = \dfrac{400}{4\pi(10^2)} = \boxed{\frac{1}{\pi} \text{ micrometers per day.}}$

(5) $x(t) = \cancel{\cos}\ 3\cos(t) + 1$

$y(t) = 3\sin(t) + 2$

~~are two~~ is one set of parametric equations (from many).

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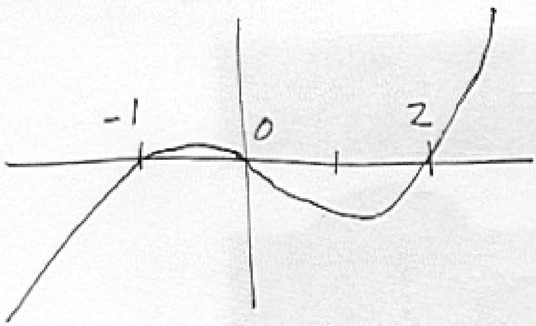
(6)

(a)



(b) The total area is $\int_{-1}^{0} x(x+1)(x-2)\,dx - \int_{0}^{2} x(x+1)(x-2)\,dx$

$= \int_{-1}^{0} (x^3 - 3x^2 - 2x)\,dx - \int_{0}^{2} x^3 - 3x^2 - 2x\,dx$

$= \left(\frac{x^4}{4} - x^3 - x\right)\Big|_{x=-1}^{0} - \left(\frac{x^4}{4} - x^3 - x\right)\Big|_{0}^{2} = \left(-\frac{1}{4} + 2\right) - (4 - 8 - 2)$

$= \frac{7}{4} + 6 = \boxed{\frac{31}{4}}$.

(c) $\int_{-1}^{2} x(x+1)(x-2)\,dx = \left(-\frac{1}{4} + 2\right) + (4 - 8 - 2) = \frac{7}{4} - 6 = \boxed{-\frac{17}{4}}$.

This is the algebraic difference of the areas above the x-axis and the area below the x-axis.