(1) (a) $f(3) \approx 0.15$. After 3 hours, there is approximately 0.15 milligrams of nicotine in the person's blood.

(b) The graph crosses the horizontal line at 0.1 after about 4 hours.

(c) The vertical intercept is 0.4. This means that, immediately after smoking the cigarette, the person has about 0.4 milligrams of nicotine in his blood.

(d) The horizontal intercept would represent the time after which the person would have no nicotine in his blood.

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(2) $\frac{7.5-7}{1.25-1} = \frac{0.5}{0.25} = 2 = \frac{1.5-1.25}{8-7.5} = \frac{1.75-1.5}{8.5-8} = \frac{2.00-1.75}{9-8.5}$

Since all of the average rates of change are the same, the function ~~must represent~~ can be linear. If so, then its equation would be

$$u - 7 = 2(t-1), \text{ or } \boxed{u(t) = 2t+5}$$

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(3) ~~33~~ $\frac{1.0625-1}{.25-0} = .25$, but $\frac{1.25-1.0625}{.5-.25} = .75$.

Since these average rates of change are not equal, this function cannot be linear.

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(4) It can represent an exponential function if ratios of ordinates are equal. $\frac{2}{1} = 2 = \frac{4}{2} = \frac{8}{4} = \frac{16}{8}$, and, since the x-values are equally spaced, this means that it can represent an exponential function. The function would be $y(x) = 1(2)^{4x}$, where "1" is the value at 0 and "2" is the ratio.

(a) The function is increasing, since the rabbits are reproducing. The function will be concave up (the rate of increasing is increasing), since the rate of increase ~~depends on~~ is proportional to the number present.

(b) The function will be an increasing function, since more people will learn of the news as time progresses. The function will ~~be~~ probably be concave down, since the rate of increase will probably decrease when most people ~~probably~~ already know the news.

(c) The function is decreasing, since the antibiotic is being eliminated. The function is concave up, since the rate of decrease is decreasing, since the rate of decrease is proportional to the amount present.

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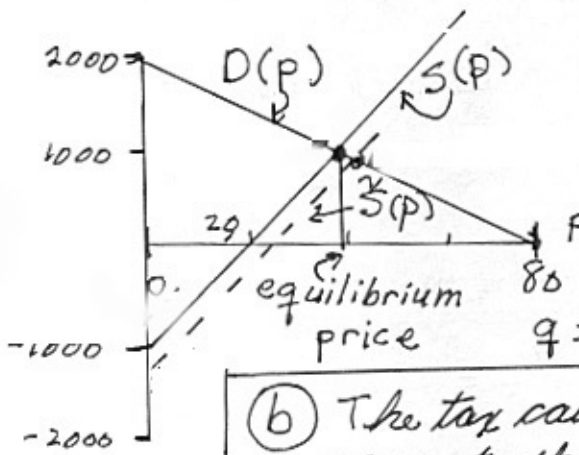
4 (a)



The equilibrium is when $S(p) = D(p)$, that is,

$2000 - 25p = 50p - 1000$

$\Leftrightarrow 75p = 3000 \Leftrightarrow \boxed{p = 40}$.

$q = S(40) = 1000$

(b) The tax causes the supply curve to move to the right six units. That is, we obtain

$\tilde{S}(p) = S(p-6) = 50(p-6) - 1000 = 50p - 1300.$

The new equilibrium price is when $50p - 1300 = 2000 - 25p$, that is, $75p = 3300 \Rightarrow 44$. $q = D(44) = 2000 - 25(44) = 900$.

(c) The consumers will pay \$4 and the producers \$2 of the tax.

(6d) The total tax collected is $69 = 6(900) \overset{\text{if}}{=} 5,400$.

(7) If the initial amount of the quantity is 1, then the amount after t hours would be $(.9)^{t/4}$. If T is the half-life, then ~~the amo~~ T obeys

$$(.5) = (.9)^{T/4} \iff \ln(.5) = (T/4)\ln(.9)$$

$$\iff \boxed{T = \frac{4\ln(.5)}{\ln(.9)} \approx 26.3 \text{ hours.}}$$