Start here for Question Number: 8 ↙ $k>0$

a) $\frac{dP}{dt} = kP$ ~~$t=1995$~~ $t=0$ $P=102$ / $t=75$, $P=200000000$

when $t=100$ what will P be equal to.

$\therefore P = A_0 e^{kt}$

$\therefore 102 = A_0 e^{k(0)}$

$102 = A_0$

$\therefore 200000000 = 102 e^{k(75)}$

$\frac{200000}{51} = e^{75k}$

$\ln \frac{100000}{51} = \ln e^{75k}$

$\ln \frac{100000}{51} = 75k$

$k = \frac{\ln \frac{100000}{51}}{75}$

$k = 0.10108133$

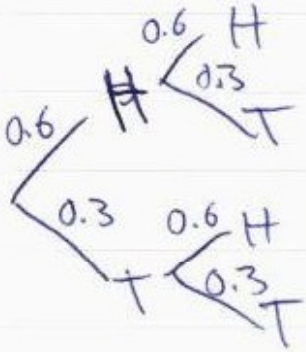
$k \doteq 0.101$

$\therefore$ when $t=100$

$P = 102 e^{0.101 \times 100}$

$P = 280.2791650$

b)



$P(HH) = 0.36$

$\therefore P(H) = 0.6$ $\therefore P(HH) = 0.6 \times 0.6$

$= 0.36$

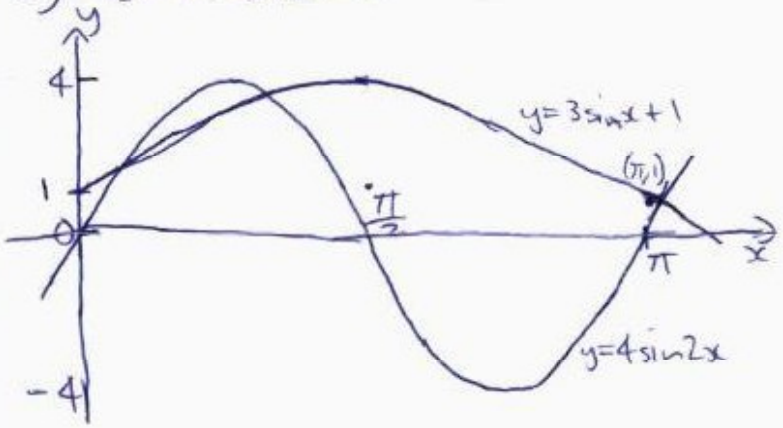
$\therefore P(T) = 1 - 0.6$

$= 0.3$

$\therefore P(TT) = 0.3 \times 0.3$

$= 0.09$

c) $y = A \sin bx$

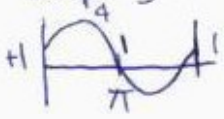


i) $A = 4$

ii) $b = 2$

iii) draw $y = 3\sin x + 1$ for $0 \leq x \leq \pi$

amp = 3 $p = 2\pi$



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d) $f(x)=x^3-3x^2+kx+8$ Find k for increasing functio.

$\Delta=b^2-4ac$

when $f'(x)$

$f'(x)=3x^2-6x+k$

b^2-4ac

$=-6^2-4(3)(k)$

$=36-12k$ increasing when $f'(x)>0$

$36-12k>0$

$-12k>-36$

$k<3$

You may ask for an extra Writing Booklet if you need more space to answer question 8.