Start here for Question Number: 8

a) $\frac{dP}{dt} = kP$

when $t=0$, $P=102$

$t=75$, $P=200$ million

$t=100$, $P=?$

$P = \int kP\, dt$

$P = kPt + c$

$102 = e$

$\therefore P = kPt + 102$

$P = e^{kt}$

$k\, e^{kt}$ $\frac{dP}{dt} = k \cdot e^{kt}$

$\therefore P = kP$

when $t=0$ $P=102$

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

$\ln 200 \text{ million} = e^{75k}$

$\therefore k = \frac{\ln 200 \text{ million}}{75}$

$P = e^{100k}$

$= 1.169607095 \times 10^{11}$

$\therefore$ There will be $1.169607095 \times 10^{11}$ cane toads in 2035.

b) $P(\text{both heads}) = 0.36$

$\therefore P(\text{both not heads}) = 1 - 0.36$

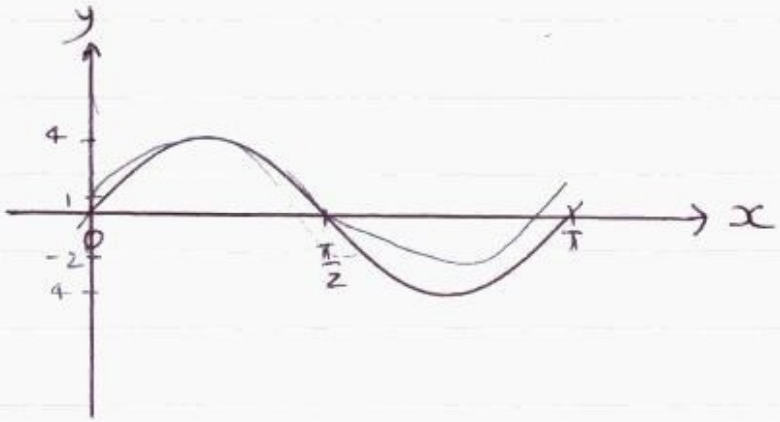
$= 0.64$

$\therefore P(\text{both tails}) = 0.64$

c) i) $y = A\sin bx$

$A = 4$

ii) $b = \pi$



$y = 3\sin x + 1$

amplitude $= 3$

~~domain~~ range: $-1 \leq \sin x \leq 1$

$-3 \leq 3\sin x \leq 3$

$-2 \leq 3\sin x + 1 \leq 4$

y-int: $x = 0$

$y = 1$

x-int: $y = 0$

$0 = 3\sin x + 1$

$-1 = 3\sin x$

$-\frac{1}{3} = \sin x$

$x =$

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

Start here for Question Number: 8

d) $f(x) = x^3 - 3x^2 + kx + 8$

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

for increasing function, $f'(x) > 0$

$\therefore \quad 3x^2 - 6x + k > 0$

$k > -3x^2 + 6x$

$k > -3x(x - 2)$