Start here for Question Number: 9

(a) (i) $A = P(1+r)^n$

$r = 0.5 \times 12 = 6$

$n = 240 \div 2 = 12$

$P = a(1+r)^n$

$= 500(1+6)^{12}$

$=$

$A_1 = \cancel{500 \times 0.5}$

b. (ii) (1) $A_1 = P \times (1.05) - 200n$

$= P \times 1.5 - 200n$

$A_2 = A_1 + (1.05) - 200n$

$= (P \times 1.5 - 200n) + (1.05) - 200n$

$= P \times 1.5 - 200n + 1.05 - 200n$

$A_3 = A_2 + (1.5) - 200n$ $\qquad S_n = \frac{a(r^n - 1)}{r-1}$

$= (P \times 1.5) + 1.5 - 200n)$

$= P \times (1.5)^2 - 200n.$

after retirement, $A_1 = (P - 400\,000) \times 1.005^n + 400\,000$

(2) $A_n = (P - 400\,000) \times 1.005^n + 400\,000$

$n = ?$ $\quad P = 232175.55$

$A_n = (232175.55 - 400\,000) \times 1.005^n + 400\,000$

$= -167824.45 \times 1005^n + 400\,000$

$A_n = 1005^n > 0$

$\ln 1.005n = 0n$

$n = 4.98754(5)1$

$= \boxed{5 \text{ months.}}$

b. $f(0) = 0$

i. To be increasing, $f'(x) > 0$

~~$f'(x) =$~~ $\boxed{2 < x < 4}$ $A = 4u^2$

ii. maximum value of $f(x) = 6$

iii. $f(6) = -3$

iv. $f'(x) =$ parabola, $f(x) =$ oblique.

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