Math 135 Written HW 09-18 : Solutions

Exercise 1 : $A(x) = 1.06x$

(a) $(A \circ A)(x) = A(A(x)) = A(1.06x) = 1.06 \cdot (1.06x)$

$$= \boxed{(1.06)^2 x}$$

$$(A \circ A \circ A)(x) = A((A \circ A)(x)) = A((1.06)^2 x)$$

$$= 1.06((1.06)^2 x)$$

$$= \boxed{(1.06)^3 x}$$

$$(A \circ A \circ A \circ A)(x) = A((A \circ A \circ A)(x)) = A((1.06)^3 x)$$

$$= 1.06((1.06)^3 x)$$

$$= \boxed{(1.06)^4 x}$$

$A \circ A(x)$ = amount of \$ after 2 years of investment

$A \circ A \circ A(x)$ = " " " " 3 " " "

$A \circ A \circ A \circ A(x)$ = " " " " 4 " " "

(b) $(\underbrace{A \circ \cdots \circ A}_{n \text{ times}})(x) = (1.06)^n(x)$.

Exercise 2 Pt $P(0.5, 0)$, curva $y = \cos(\pi x)$.

(a) i) $Q = (0, \cos(\pi \cdot 0)) = (0, \cos(0)) = (0, 1)$

slope of secant lin $= \frac{\Delta y}{\Delta x} = \frac{0 - 1}{0.5 - 0} = \frac{-1}{0.5} = \boxed{-2}$

ii) $Q = (0.4, \cos(0.4\pi)) = (0.4, 0.3091\ldots)$

slope of secant lin $= \frac{\Delta y}{\Delta x} = \frac{0 - 0.3091\ldots}{0.5 - 0.4} = \boxed{-3.091\ldots}$

iii) $Q = (0.49, \cos(0.49\pi)) = (0.49, 0.031412\ldots)$

$\frac{\Delta y}{\Delta x} = \frac{0 - 0.03141\ldots}{0.5 - 0.49} = \boxed{-3.1412\ldots}$

iv) $Q = (0.499, \cos(0.499\pi)) = (0.499, 0.00314159\ldots)$

$\frac{\Delta y}{\Delta x} = \frac{0 - 0.0314159\ldots}{0.5 - 0.499} = \boxed{-3.14159\ldots}$

v) $Q = (1, \cos(1 \cdot \pi)) = (1, -1)$

$\frac{\Delta y}{\Delta x} = \frac{0 - (-1)}{0.5 - 1} = \frac{1}{-0.5} = \boxed{-2}$

vi) $Q = (0.6, \cos(0.6\pi)) = (0.6, -0.3090\ldots)$

$$\frac{\Delta y}{\Delta x} = \frac{0 - (-0.3090\ldots)}{0.5 - 0.6} = \boxed{-3.090\ldots}$$

vii) $Q = (0.51, \cos(0.51\pi)) = (0.51, -0.031412\ldots)$

$$\frac{\Delta y}{\Delta x} = \frac{0 - (0.031412\ldots)}{0.5 - 0.51} = \boxed{-3.1412\ldots}$$

viii) $Q = (0.501, \cos(0.501\pi)) = (0.501, -0.00314159\ldots)$

$$\frac{\Delta y}{\Delta x} = \frac{0 - (-0.00314159\ldots)}{0.5 - 0.501} = \boxed{-3.14159\ldots}$$

(b) As $x \to 0.5$, the slopes of the secant lines seem to be approaching $\boxed{-\pi = -3.14159265\ldots}$

(c)