Question 1

① $f(x) = \sin(2\pi x) + x$

$f'(x) = 2\pi \cos(2\pi x) + 1$

$p_i(x) = f(i) + f'(i)(x-i) + x\varepsilon(x)$

$p_0(x) = \sin(0) + 0 + (2\pi \cos(0) + 1)x$

$= (2\pi + 1)x$

$p_1(x) = \sin(\pi) + \frac{1}{2} + (x - \frac{1}{2})(2\pi \cos(\pi) + 1)$

$= 0 + \frac{1}{2} + (x - \frac{1}{2})(-2\pi + 1)$

$$p_1(x) = \frac{1}{2} + (-2\pi+1)\left(x-\frac{1}{2}\right) + x\,\varepsilon(x)$$

$$p_2(x) = 2 + (2\pi+1)(x-1) + x\,\varepsilon(x)$$

$$p_3(x) = \frac{3}{2} + (\quad)\left(x-\frac{3}{2}\right) + x\,\varepsilon(x)$$

② $\lim_{x \to 1/2} p_0(x) = 2\pi + 1$

$$p_1\left(\frac{1}{2}\right) = 2 + (2\pi+1)\left(1/2 - \frac{1}{2}\right) = 2$$

$$\lim_{x \to 1} p_1(x) = 2 - \pi + \frac{1}{2} = \frac{3}{2} - \pi$$

$$p_1(1) =$$