1) $f(x) = \sin(x)$

$x_0 = \pi/2, \quad x_1 = \pi/3, \quad x_2 = 0$

We will get a polynomial of degree 2.

Now, $|f(x) - P_2(x)| = \frac{f^3(\xi)}{3!}(x - \pi/2)(x - \pi/3)(x - 0)$

$= \frac{-\cos(x)}{6} \times (x)(x - \pi/2)(x - \pi/3)$

Here, $\xi \in [-2, 2]$

Now, $\max(-\cos(\xi)) = 1$

Since, At 0, value of $-\cos(\xi)$ can be max.

Again, $x(x - \pi/2)(x - \pi/3) = w(x)$ should be max

4) $w(x) = x^3 - 6x^2 + 4$

Now, differentiating $w(x)$

$\Rightarrow 3x^2 - 12x = 0$

or, $3x(x-4) = 0$

$\therefore x = 0$ or, $x = 4$

x	$w(x)$
0	4
4	-28
-2	-28
2	-12

$\therefore$ maximum value, $|w(x)| = 28$