H1)

$$f(x) = \sqrt{x}$$

a) $$f'(x) = \frac{1}{2\sqrt{x}}$$

$$f''(x) = -\frac{1}{4x\sqrt{x}}$$

$$f'''(x) = \frac{3}{8x^2\sqrt{x}}$$

b) $$P_2(x) = f(x_0) + \frac{f'(x_0)(x-x_0)}{1!} + \frac{f''(x_0)(x-x_0)}{2!}$$

$x_0 = 4$

$f(x_0) = f(4) = 2$

$f'(x_0) = f'(4) = 1/4$

$f''(x_0) = f''(4) = -1/32$

$$P_2(x) = f(x_0) + \frac{f'(x_0)(x-x_0)^1}{1!} + \frac{f''(x_0)(x-x_0)^2}{2!}$$

$$P_2(x) = 2 + \frac{1/4 \cdot (x-4)}{1!} + \frac{-1/32 \cdot (x-4)^2}{2!}$$

$$P_2(x) = 2 + \frac{x-4}{4} + \frac{-(x-4)^2}{64}$$

$$P_3(x) = f(x_0) + \frac{f'(x_0)(x-x_0)}{1!} + \frac{f''(x_0)(x-x_0)^2}{2!} + \frac{f'''(x_0)(x-x_0)^3}{3!}$$

$$f'''(x_0) = f'''(4) = 3/2^8 \approx 0.01172$$

$$P_3(x) = 2 + \frac{1/4 \cdot (x-4)}{1!} + \frac{-1/32 \cdot (x-4)^2}{2!} + \frac{3/2^8 \cdot (x-4)^3}{3!}$$