1. $f(x) = x^3$

   (a)

$$P_2(x) = f(x_0) + f'(x_0)(x - x_0) + \frac{f''(x - x_0)^2}{2!}$$
$$P_2(x) = f(0) + f'(0)(x - 0) + \frac{f''(x - 0)^2}{2!}$$
$$P_2(x) = 0 + 0(x - 0) + \frac{0(x - 0)}{2!}$$
$$P_2(x) = 0$$
$$R_2(x) = \frac{f'''(\epsilon(x))(x - x_0)^3}{3!}$$
$$R_2(x) = \frac{f'''(\epsilon(x))(x - 0)^3}{3!}$$
$$R_2(x) = \frac{f'''(\epsilon(x))x^3}{3!}$$
$$f(x) = \frac{f'''(\epsilon(x))x^3}{3!}$$

   (b)