Punto 1- Integración:

Se tiene $f(x) \approx P_1(x) = \frac{x-b}{a-b} f(a) + \frac{x-a}{b-a} f(b)$.

De modo que $I = \int_a^b f(x)\,dx \approx \int_a^b P_1(x)\,dx = \frac{f(a)}{b-a}\int_a^b (b-x)\,dx + \frac{f(b)}{b-a}\int_a^b (x-a)\,dx = \cdots$

$$\cdots = \frac{f(a)}{b-a}\left[bx - \frac{x^2}{2}\right]_{x=a}^{x=b} + \frac{f(b)}{b-a}\left[\frac{x^2}{2} - ax\right]_{x=a}^{x=b} = \cdots$$

$$\cdots = \frac{f(a)}{b-a}\left(\overset{+b^2/2}{\cancel{b^2}} - \frac{b^2}{2} - ab + \frac{a^2}{2}\right) + \frac{f(b)}{b-a}\left(\frac{b^2}{2} - ab \overset{+a^2/2}{\cancel{- \frac{a^2}{2} + a^2}}\right) = \cdots$$

$$\cdots = \left(\frac{b^2 - 2ab + a^2}{2}\right)\left(\frac{1}{b-a}\right)(f(a) + f(b)) = \cdots$$

$$\cdots = \frac{(b-a)^2}{2(b-a)}(f(a) + f(b)) = \frac{b-a}{2}(f(a) + f(b))$$