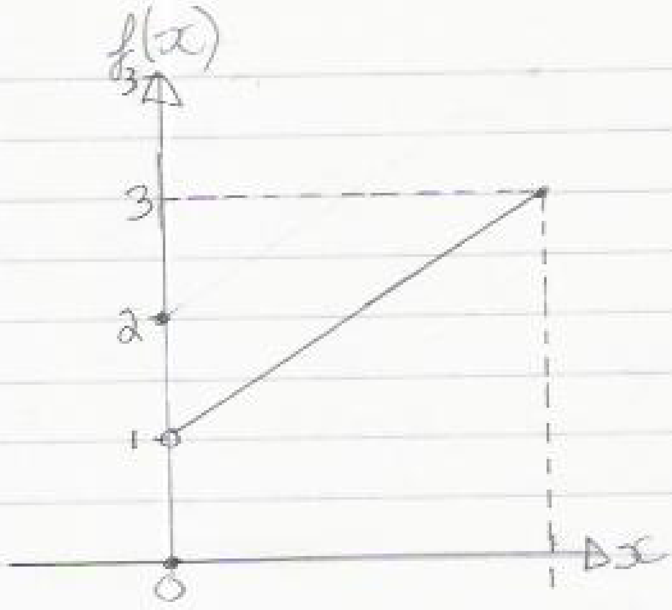
9) a)



1/1

b) $L(f,P_n) = \sum_{i=1}^{n} m_i \delta x_i$

$f(x)$ is increasing on $[0,1]$, hence $m_i = f(i-1)$

$L(f,P_3) = \sum_{i=1}^{3} \frac{f\left(\frac{i-1}{n}\right)}{3}$

$= \frac{1}{3}f(0) + \frac{1}{3}f(1/3) + \frac{1}{3}f(2/3)$

$= 1/3 + 1/3 \times (1 + 2/3) + 1/3(1 + 4/3)$

$= 1/3 + 5/9 + 7/9 = 5/3$

$U(f,P_n) = \sum_{i=1}^{n} M_i \delta x_i$

$f(x)$ is increasing on $[0,1]$ except for $x=0$ where $f(x)=2$, so $M_i = f(x_i)$

$U(f,P_3) = \frac{2}{3} + \frac{1}{3}f(2/3) + \frac{1}{3}f(1)$

$= \frac{2}{3} + \frac{1}{3} \times (1 + 4/3) + \frac{1}{3} \times 3$

$= 2/3 + 7/9 + 1 = 22/9$

5/5

c) $L(f,P_n) = \frac{2n-1}{n} = 2 - \frac{1}{n}$

as $n \to \infty$ $L(f,P_n) \to 2$