6- $f(x) = \begin{cases} \dfrac{2x-1}{10} & 1 \leq x \leq 2 \\ 0,4 & 4 \leq x \leq 6 \end{cases}$

$$P(1,5 \leq x \leq 2) = \int_{1,5}^{2} \frac{2x-1}{10}\, dx = \frac{1}{10}\left[x^2 - x\right]_{1,5}^{2} = \frac{1,75 - 0,5}{10} = 0,125$$

$$P(2,5 \leq X \leq 3,5) = 0 \quad \text{(No definido)}$$

$$P(4,5 \leq x \leq 5,5) = \int_{4,5}^{5,5} 0,4\, dx = \left[0,4x\right]_{4,5}^{5,5} = 0,4$$

$$P(1,2 \leq X \leq 5,2) = \int_{1,2}^{2} \frac{2x-1}{10} + \int_{4}^{5,2} 0,4\, dx = \frac{1}{10}(2,56 - 0,8) + 0,48 =$$

$$= 0,656$$

b) $$E[x] = \int_1^2 x\, \frac{2x-1}{10}\, dx + \int_4^6 0,4x\, dx =$$

$$= \frac{1}{10}\left[\frac{2x^3}{3} - \frac{x^2}{2}\right]_1^2 + 0,4\left[\frac{x^2}{2}\right]_4^6 = 0,31667 + 4 = 4,31667$$

c) $$M_x[t] = E[e^{tx}] = \int_1^2 e^{tx}\, \frac{2x-1}{10}\, dx + \int_4^6 e^{tx}\, 0,4\, dx =$$

$$= \frac{1}{10}\left[\frac{2xe^{tx}}{t} - \frac{2e^{tx}}{t^2}\right]_1^2 - \left[\frac{e^{tx}}{t}\right]_1^2 + 0,4\left(\left[\frac{e^{tx}}{t}\right]_4^6 =\right.$$

$$= \frac{1}{10}\left(\frac{3e^{2t} - e^{t}}{t} - \frac{2e^{2t}}{t^2} + \frac{2e^{t}}{t^2}\right) + \frac{0,4\, e^{4t}(e^{2t} - 1)}{t}$$