3. a) $E[2^x] = 2^0 \cdot (1-p) + 2^1 \cdot p$

$= 1(1-p) + 2p$

$= 1 - p + 2p$

$= 1 + p$

b) $E[X] = \frac{2}{2} + \frac{5}{2} = 3.5$

c) $Y = x^4 \rightarrow -1^4(\frac{1}{5}) + 0^4 \cdot (\frac{2}{5}) + 1^4(\frac{2}{5})$

$y = 0, \; P(Y) = 2/5$

$y = 1, \; P(Y) = 3/5$

d) $E[Y] = E[x^4] = -1^4 \cdot (\frac{1}{5}) + 0^4 \cdot (\frac{2}{5}) + 1^4(\frac{2}{5})$

$1 \cdot (\frac{1}{5}) + 0 + (\frac{2}{5})$

$= \frac{3}{5}$