The random variable X has probability generating function $\mathrm{G}_X(t)$ given by

$$G_X(t) = \frac{1}{5} + pt + qt^2,$$

where p and q are constants.

(a) Given that
$$E(X) = 1.1$$
, find the numerical value of $Var(X)$. [4]

The random variable Y has probability generating function $G_Y(t)$ given by

$$G_Y(t) = \frac{2}{3}t(1 + \frac{1}{2}t^2).$$

The random variable Z is the sum of independent observations of X and Y.

(b) Find the probability generating function of Z. [2]

(c) Find
$$P(Z > 2)$$
. [1]

(d) State the most probable value of Z. [1]