1. Using the Normal distribution of Q2 of the previous assignment, find, in an 'iterative' manner, the conditional distribution of

   (a) X_1, X_2, X_4 given that $X_3 = -2.3$,

   (b) X_2, X_4 given that $X_1 = -1.7$ and $X_3 = -2.3$,

   (c) X_2 given that $X_1 = -1.7$, $X_3 = -2.3$ and $X_4 = 0.8$,
   (just say 'Normal' and give the parameters).

   (d) Then, repeat Part c, using the 'direct' formulas.

2. Derive, by direct integration, the joint MGF of a k-variate distribution with the following PDF

$$\frac{\exp\left(-\frac{(\mathbf{x}-\boldsymbol{\mu})^{\mathrm{T}}\mathbb{V}^{-1}(\mathbf{x}-\boldsymbol{\mu})}{2}\right)}{(2\pi)^{k/2}\det(\mathbb{V})^{1/2}}$$

   where $\mathbb{V}$ is a symmetric positive-definite matrix.

3. Consider a general 4-dimensional Normal distribution (μ_i and σ_i^2, $i = 1$ to 4, are the four means and four variances, ρ_{ij}, $1 \leq i < j \leq 4$, are the six correlation coefficients). Find formulas for $\mu_{3|12}$, $\sigma_{3|12}$ and $\rho_{34|12}$ (assuming that $X_1 = \mathbf{x}_1$ and $X_2 = \mathbf{x}_2$). Express them in a form which makes the $1 \leftrightarrow 2$ symmetry (and the $3 \leftrightarrow 4$ symmetry, in the last case) explicit!