Here are the moment generating functions (MGFs) for some of the distributions we have discussed. Unless otherwise specified, the MGF is defined for all real $t$.

1) Bernoulli $Ber(p)$:

$$M(t) = 1 + p(e^t - 1)$$

(1)

This is easy to derive directly from the definition.

2) Binomial $Bin(n, p)$:

$$M(t) = \left(1 + p(e^t - 1)\right)^n$$

(2)

This is derived using the binomial theorem, as shown in class. Note this is also the $n$th power of the MGF for $Ber(p)$; this is not an accident, as we will discuss later in the semester.

3) Poisson distribution $Poisson(\lambda)$:

$$M(t) = e^{\lambda(e^t - 1)}$$

(3)

This uses the Taylor series for $e^x$.

4) Exponential distribution $Exp(\lambda)$:

$$M(t) = \frac{\lambda}{\lambda - t}, \quad t < \lambda.$$  

(4)

This is easily computed from the definition.

5) Standard normal distribution $N(0, 1)$:

$$M(t) = e^{t^2/2}$$

(5)

This is most easily computed by a trick involving completing squares. See the text.