# HW 06 SOLUTIONS

## Practice Problems

### 3.145

$m(t) = E(e^{ty}) = \sum_{y=0}^{n} \binom{n}{y}(pe^t)^y(1-p)^{n-y} = (pe^t + 1 - p)^n$

### 3.147

$m(t) = E(e^{ty}) = \sum_{y=1}^{\infty} pe^{ty}q^{y-1} = pe^t \sum_{(y-1)=0}^{\infty}(qe^t)^{y-1} = \frac{pe^t}{1-qe^t}$

Note the second-to-last step is because $e^{ty} = (e^t)^{y-1}e^t$ and the final step is recognizing the geometric series $\sum_{n=0}^{\infty} a^n = \frac{1}{1-a}$.

### 3.149

This is the moment–generating function for the binomial with n = 3 and p = .6.

### 3.155

Differentiate to find the necessary moments:

a. $E(Y) = \frac{7}{3}$

b. $V(Y) = E(Y^2) - [E(Y)]^2 = 6 - \left(\frac{7}{3}\right)^2 = \frac{5}{9}$

c. Since $m(t) = E(e^{tY})$, and $Y$ can only take on values 1, 2, and 3 with probabilities $\frac{1}{6}$, $\frac{2}{6}$, and $\frac{3}{6}$ respectively.