BIOS 625: Categorical Data Analysis and Generalized Linear Models Computing Basics in SAS – Exercise 2

1. Calculate $\sum_{x=1}^{11}\left[\frac{x^2}{x+1} - 2x\right]$

2. Calculate $\prod_{y=6}^{10}\frac{y+1}{y+2}$

3. Assuming $y \sim Poisson(\theta)$ and $\theta = 4.5$:

   (a) Calculate $P(y < 10)$.

   (b) Calculate $P(y \geq 5)$.

4. Simulate a sample of $n = 20$ standard normal random variables. Calculate the mean and standard deviation of this sample.

   - *Hint*: Try the following

     ```
     seed=45;c=j(n,1,seed);z=normal(c);
     ```

5. Simulate a sample of $n = 20$ normal random variables with mean $\mu = 10$ and variance $\sigma^2 = 2$. Calculate the mean and standard deviation of this sample.

   - *Hint*: If $z \sim N(0, 1)$, then $x = \mu + z\sigma \sim N(\mu, \sigma^2)$.

6. Simulate $m = 10$ samples, each consisting of $n = 20$ normal random variables with mean $\mu = 10$ and variance $\sigma^2 = 2$.

   (a) Calculate the mean and standard deviation for each sample.

   (b) Calculate the overall mean (i.e. "mean of the means") and standard error of the sample means.

   - *Hint*: You will need to "capture" $\bar{x}$ in each sample. There are several ways to do this; here are two:
     - Update a vector with the requisite information. For instance, create a "zero-vector" of m degrees (called v), and then assign the i^{th} mean to the i^{th} row of v. This is done with the following code:

```
do i=1 to m; .... v[i,]=mean; ... end;
```

- You can "create" a vector as you cycle through the m simulated samples by "stacking" the means on top of each other. You've done this before when you created vectors and matrices.