Calc II - A few probability problems

1. Use u-substitution to translate the following normal integral into a standard normal integral:

$$\frac{1}{\sqrt{2\pi}\,3}\int_0^4 e^{-(x-1)^2/18}dx.$$

2. I've got an unfair coin that comes up heads 3/5 of the time. Suppose I flip that coin 500 times, count the number of heads I get, and call that value S.
   (a) Find $E(S)$ - i.e. the mean or expectation of S.
   (b) Find $\sigma^2(S)$ and $\sigma(S)$ - i.e. the variance and standard deviation of S
   (c) Write down a normal integral that represents $P(290 < S < 320)$.
3. I've got a 10 sided die with
   - Three sides labeled 1,
   - four sides labeled 2, and
   - three sides labeled 3.

   Let X denote the numerical value of 1 roll and let S the sum of the numerical values of 300 rolls.
   (a) Find $E(X)$ and $\sigma(X)$.
   (b) Find $E(S)$ and $\sigma(S)$.
   (c) Write down a normal integral representing $P(S > 595)$