## CS 333202: Probability and Statistics HW9 Part I

1. A small college has 1095 students. What is the approximate probability that more than five students were born on Christmas day? Assume that the birthrates are constant throughout the year and that each year has 365 days.
2. If $X$ is a normal random variable with parameters $\mu=3$ and $\sigma^{2}=9$, find $P\{|X-3|>6\}$
3. Suppose that a binary message - either 0 or 1 - must be transmitted by wire from location $A$ to location $B$. However, the data sent over the wire are subject to a channel noise disturbance, so to reduce the possibility of error, the value 2 is sent over the wire when the message is 1 and the value -2 is sent when the message is 0 . If $x, x= \pm 2$, is the value sent at location $A$, then $R$, the value received at location $B$, is given by $R=x+N$, where $N$ is the channel noise disturbance. When the message is received at location $B$ the receiver decodes it according to the following rule:

> If $R \geq 0.5$, then 1 is concluded.
> IF $R<0.5$, then 0 is concluded.

When $N$ is a standard normal random variable, what is the error probability?

