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ECE 575 Matlab Simulation

Part 1

Performance of BPSK Modulation

$N \rightarrow$ length of bit-stream (eg. 2000)

Generate bit-vectors of length N using `randn` command

eg. \rightarrow `bit_vec = randn(1, N) > 0`

BPSK modulate it

\rightarrow `sym_vec = 2 * bit_vec - 1`

i.e., $0 \rightarrow -1$
 $1 \rightarrow 1$

\rightarrow `SNR-dB = 10 dB` \rightarrow given a specific SNR value

$SNR-dB = 10 \log_{10} \frac{S}{N}$ \rightarrow signal power (= 1 in our case)
 N \rightarrow noise-power

$$N = \frac{S}{10^{SNR-dB/10}}$$

$$N = 10^{-SNR-dB/10}$$

\rightarrow `Pn = 10^{-SNR-dB/10}` \rightarrow compute noise power

\rightarrow `noise = Pn * randn(1, N)` \rightarrow generate noise

\rightarrow `received_vec = sym_vec + noise` \rightarrow received signal

\rightarrow `demod_vec = received_vec > 0` \rightarrow demodulate

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```
error-vec = abs(bit-vec-received-vec);  
error-sum = sum(error-vec)
```

For the above script we simulated only a single frame and found errors at demodulator. Your script for all SNR simulations will be of

```
N = 1000;
```

```
SNR-dB-vec = 0:3:40
```

```
for indx = 1 : length(SNR-dB)
```

```
SNR-dB = SNR-dB-vec(indx);
```

```
Pn = 10SNR-dB/10;
```

```
dat-vec = rand(1, N);
```

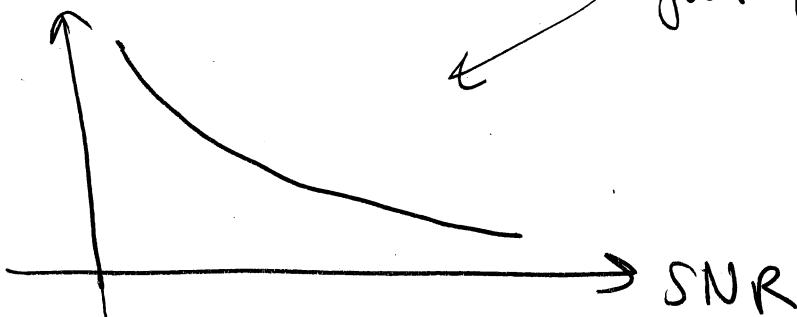
```
Sym-vec = 2 * dat-vec - 1
```

```
noise = Pn * rand(1, N);
```

```
received-vec = Sym-vec + noise
```

end

BER
(dB)



your program will draw such a performance graph