

Started on	Friday, 17 November 2023, 7:25 AM
State	Finished
Completed on	Sunday, 19 November 2023, 9:19 PM
Time taken	2 days 13 hours
Grade	9.00 out of 10.00 (90%)

Question **1**
Correct
Mark 1.00 out of 1.00
🚩 Flag question

PDF of amplitude a of Rayleigh fading channel is

- Select one:
- ☐ $2ae^{-a^2}, -\infty < a < \infty$
 - ☒ $2ae^{-a^2}, a \geq 0$ ✓
 - ☐ $ae^{-a^2}, a \geq 0$
 - ☐ $ae^{-a^2}, -\infty < a < \infty$

Your answer is correct.
The correct answer is: $2ae^{-a^2}, a \geq 0$

Question **2**
Correct
Mark 1.00 out of 1.00
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The integral $\int_{-\infty}^{\infty} a^2 e^{-\frac{a^2}{2\sigma^2}} da$ evaluates to

- Select one:
- ☐ 0
 - ☒ $\sqrt{2\pi}\sigma^3$ ✓
 - ☐ $2\sigma^2$
 - ☐ σ^3

Your answer is correct.
The correct answer is: $\sqrt{2\pi}\sigma^3$

Question **3**
Correct
Mark 1.00 out of 1.00
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Which of the following statements is true?

Select one:

- ☐ BER of the wireless channel $\propto e^{-\frac{1}{2}SNR}$ while that of the wireline channel $\propto \frac{1}{SNR}$
- ☐ BER of the wireline and wireless channel $\propto e^{-\frac{1}{2}SNR}$
- ☐ BER of the wireline and wireless channel $\propto \frac{1}{SNR}$
- ☒ BER of the wireline channel $\propto e^{-\frac{1}{2}SNR}$ while that of the wireless channel $\propto \frac{1}{SNR}$ ✓

Your answer is correct.

The correct answer is: BER of the wireline channel $\propto e^{-\frac{1}{2}SNR}$ while that of the wireless channel $\propto \frac{1}{SNR}$

Question 4

Correct

Mark 1.00 out of 1.00

🚩 Flag question

SER of M -ary QAM for $SNR = \rho$ is

Select one:

- ☐ $4 \left(1 - \frac{1}{\sqrt{M}}\right) Q \left(\sqrt{\frac{\rho}{(M-1)}} \right)$
- ☐ $\left(1 - \frac{1}{\sqrt{M}}\right) Q \left(\sqrt{\frac{3\rho}{(M-1)}} \right)$
- ☒ $4 \left(1 - \frac{1}{\sqrt{M}}\right) Q \left(\sqrt{\frac{3\rho}{(M-1)}} \right)$ ✓
- ☐ $4 \left(1 - \frac{1}{M}\right) Q \left(\sqrt{\frac{3\rho}{(\sqrt{M}-1)}} \right)$

Your answer is correct.

The correct answer is: $4 \left(1 - \frac{1}{\sqrt{M}}\right) Q \left(\sqrt{\frac{3\rho}{(M-1)}} \right)$

Question 5

Correct

Mark 1.00 out of 1.00

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Consider the random signal detection problem described in class. The optimal detector for this problem is given as choose \mathcal{H}_1 if

Select one:

- ☐ $\bar{\mathbf{s}}^T \bar{\mathbf{y}} \leq \gamma$
- ☒ $\|\bar{\mathbf{y}}\|^2 > \gamma$ ✓
- ☐ $\|\bar{\mathbf{y}}\|^2 \leq \gamma$
- ☐ $\bar{\mathbf{s}}^T \bar{\mathbf{y}} > \gamma$

Your answer is correct.

The correct answer is: $\|\bar{\mathbf{y}}\|^2 > \gamma$

Question **6**

Correct

Mark 1.00 out of 1.00

🚩 Flag question

The optimal detector for the random signal detection problem is

Select one:

- ☐ Matched filter
- ☐ Generalized matched filter
- ☐ Phase detector
- ☒ Energy detector ✓

Your answer is correct.

The correct answer is: Energy detector

Question **7**

Correct

Mark 1.00 out of 1.00

🚩 Flag question

The χ^2_N -Central chi-squared RV with N degrees of freedom is

Select one:

- ☒ Sum of squares of N i.i.d. standard Normal random variables ✓
- ☐ Sum of N i.i.d. standard Normal random variables
- ☐ Sum of squares of N i.i.d. unit mean unit variance Normal random variables
- ☐ Sum of N i.i.d. unit mean unit variance Normal random variables

Your answer is correct.

The correct answer is: Sum of squares of N i.i.d. standard Normal random variables

Question **8**

Correct

Mark 1.00 out of 1.00

🚩 Flag question

The PDF of χ^2_N -Central chi-squared RV with N degrees of freedom is

Select one:

- ☐ $\frac{1}{2^{\frac{N}{2}-1}\Gamma(\frac{N}{2})}x^{\frac{N}{2}}e^{-\frac{1}{2}x}, x \geq 0$
- ☐ $\frac{1}{2^{\frac{N}{2}}\Gamma(N)}x^{\frac{N}{2}-1}e^{-x}, x \geq 0$
- ☒ $\frac{1}{2^{\frac{N}{2}}\Gamma(\frac{N}{2})}x^{\frac{N}{2}-1}e^{-\frac{1}{2}x}, x \geq 0$ ✓
- ☐ $\frac{1}{2^{\frac{1}{2}}\Gamma(\frac{1}{2})}x^{\frac{N}{2}-1}e^{-\frac{1}{2}x}, x \geq 0$

Your answer is correct.

The correct answer is: $\frac{1}{2^{\frac{N}{2}}\Gamma(\frac{N}{2})}x^{\frac{N}{2}-1}e^{-\frac{1}{2}x}, x \geq 0$

Question **9**
Incorrect

Mark 0.00 out of 1.00

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The P_{FA} for the random signal detection problem is

Select one:

- ☐ $Q\left(\frac{\gamma}{\sigma^2}\right)$
- ☒ $\frac{\Gamma(\frac{N}{2}, \frac{\gamma}{\sigma^2})}{\Gamma(\frac{N}{2})}$ ✖
- ☐ $Q_{\chi^2_N}\left(\frac{2\gamma}{\sigma^2}\right)$
- ☐ $\frac{\Gamma(\frac{N}{2}, \frac{\gamma}{2\sigma^2})}{\Gamma(\frac{N}{2})}$

Your answer is incorrect.

The correct answer is: $\frac{\Gamma(\frac{N}{2}, \frac{\gamma}{2\sigma^2})}{\Gamma(\frac{N}{2})}$

Question **10**
Correct

Mark 1.00 out of 1.00

🚩 Flag question

The P_D for the random signal detection problem is

Select one:

- ☐ $\frac{\Gamma(\frac{N}{2}, \frac{\gamma}{\sigma^2 + \sigma_s^2})}{\Gamma(\frac{N}{2})}$
- ☒ $Q_{\chi^2_N}\left(\frac{\gamma}{\sigma^2 + \sigma_s^2}\right)$ ✔
- ☐ $Q\left(\frac{\gamma}{\sigma^2 + \sigma_s^2}\right)$
- ☐ $\frac{\Gamma(\frac{N}{2}, \frac{\gamma}{\sigma^2})}{\Gamma(\frac{N}{2})}$

Your answer is correct.

The correct answer is: $Q_{\chi^2_N}\left(\frac{\gamma}{\sigma^2 + \sigma_s^2}\right)$

[Finish review](#)