Question 1/9 (2 p.)

Evaluate the sum below:

$$S = \sum_{k=0}^{21} \binom{21}{k} e^{\frac{jk\pi}{2}}$$

Hint:

$$\binom{n}{r} = \frac{n!}{r!\,(n-r)!}$$

- $-1024(1+j)$
- $-1024j$
- -1024
- $1024(1+j)$
- $1024(1-j)$

Question 2/9 (3 p.)

Find the general solution to

$$\cos(x)\frac{dy}{dx} + \sin(x)y = x \cdot \cos^2(x)$$

- ○ $y = \cos^2(x)(x^2 + Cx^2)$
- ○ $y = \cos^2(x)(2x + C)$
- ○ $y = \cos^2(x)(x^2 + C)$
- ○ $y = \frac{x^2}{2}\cos(x) - C \cdot \cos(x)$
- ○ $y = \cos(x)(x^2 - C)$

Question 3/9 (3 p.)

Find the general solution to

$$\frac{dr}{d\theta} = \frac{(r+\theta)^2}{\theta^2} - 1$$

- ○ $\frac{-\theta^2}{-\theta+1} + C$
- ○ $\frac{\theta^2}{-\ln(\theta)+C}$
- ○ $\frac{-\theta^2}{-1+C\theta}$
- ○ $\frac{\theta^2}{-\theta+1} + C$
- ○ $\frac{\theta^2}{-\theta+C}$

Question 5/9 (2 p.)

Find an expression for the Euler−Cauchy equation whose general solution is given by
$y = C_1x^4 + C_2 \cdot \ln(x)x^4$

- $x^2y'' - 8xy' + 16y = 0$
- $x^2y'' - 7xy' + 16y = 0$
- $x^2y'' - 3xy' + 4y = 0$
- $x^2y'' - 4xy' + 16y = 0$

Question 7/9 (2 p.)

Find an expression for the nonhomogeneous linear ODE whose general solution is given by

$$y = Ae^{4x}\cos(x) + Be^{4x}\sin(x) + e^{-2x}$$

- ○ $y''+8y'+17y= e^{-2x}$
- ○ $y''-8y'+17y= 2e^{-2x}$
- ○ $y''-8y'+17y= 37e^{-2x}$
- ○ $y''+8y'+17y= 2e^{-2x}$
- ○ $y''-8y'+17y= 74e^{-2x}$