

PHYS 3160 HOMEWORK ASSIGNMENT 07

DUE DATE Submission is voluntary!

Instructor: Dr. Daniel Erenso

Name: _____

Mandatory problems: 2 & 3

Student signature: _____

Comment: _____

P #	1	2	3	4	5	Score
Score	/	/	/	/	/	/100

1. Using the ratio test show that the infinite series

$$J_p(x) = \sum_{n=0}^{\infty} \frac{(-1)^n}{\Gamma(n+1)\Gamma(n+1+p)} \left(\frac{x}{2}\right)^{2n+p} \quad (1)$$

is a convergent series.

2. Using Eq. (??) and

$$J_{-p}(x) = \sum_{n=0}^{\infty} \frac{(-1)^n}{\Gamma(n+1)\Gamma(n+1-p)} \left(\frac{x}{2}\right)^{2n-p}. \quad (2)$$

write out the first few terms of $J_0(x)$, $J_1(x)$, $J_2(x)$, $J_{-1}(x)$, and $J_{-2}(x)$.

3. The differential equation for transverse vibration of a string whose density increases linearly from one end to the other is

$$\frac{d^2 y}{dx^2} + (\lambda x + \beta) y = 0$$

where α and β are constants. Find the general solution of this equation in terms of Bessel functions.

Hint: make change of variable $\lambda x + \beta = \lambda u$.

4. Boas 12.19#3;
5. Boas 12.20#1;
6. Boas 12.19#3