Mansoura University
Faculty of Engineering

Midterm Exam.
Thursday 4/4/2019

Biomedical Engineering Programs

Prof. Dr. Magdi S. El-Azab | Mathematics 4 | Time allowed: 60 min.

Name.

Answer the following questions

1. [5 pts.] Evaluate the following integral

$$\int_0^\infty e^{-\sqrt[4]{t}}\, dt$$

2. [5 pts] Prove that $\Gamma\left(n+\frac{1}{2}\right) = \frac{\sqrt{\pi}}{2^{2n}}\frac{(2n)!}{(n)!}$, and then use this formula to evaluate $\Gamma(5/2)$.

3. [5 pts] Using the graph in the xy-plane, classify the following partial differential equation

$$xu_{xx} + yu_{yy} + 4u_y - 6xy = 0$$

4. [5 pts] Use the technique of separation of variables to solve the following boundary value problem:

$$\begin{aligned}
&u_{xx} + u_{yy} = 0, && 0 \le x \le \pi,\quad 0 \le y \le \pi,\\
&u_x(0,y) = u_x(\pi,y) = 0, && 0 \le y \le \pi\\
&u(x,0) = 0, \quad 0 \le x \le \pi\\
&u(x,\pi) = 10 - 5\cos x, && 0 \le x \le \pi
\end{aligned}$$

What is the value of $u\left(\frac{\pi}{2}, 3\right)$?.