Score:

Name: Solutions
Period (circle one): 1 2 3 4 5 6
Team (circle one): a b c d e f

SM286 – Quiz 5 – Section 4.1
Theory of Higher Order Linear ODEs

1. Consider the following differential equation:

$$(x^2+3x-4)\frac{d^2y}{dx^2}+\left(\frac{1}{x}\right)\frac{dy}{dx}+e^x y=0.$$

For what intervals of x are you guaranteed the existence of a unique solution?

$(x^2+3x-4)=0 \Rightarrow (x+4)(x-1)\neq 0 \Rightarrow x\neq -4, 1$

$x=0$

$(-\infty,-4),(-4,0),(0,1),(1,\infty)$

2. Both x and $3x$ are solutions for the differential equation $\frac{d^2y}{dx^2}=0$. Use a Wronskian to test if these solutions are linearly independent.

$$W=\begin{vmatrix} x & 3x \\ 1 & 3 \end{vmatrix} = 3x-3x=0$$

not linearly independent