MATH 246 Homework 1.1
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## Directions:

- Work should be done neatly and on separate paper.
- Enough work must be shown so that the steps you are taking is clear.

1. The following DE is not given as explicit but may be rewritten. Do this and then solve:

$$
t y^{\prime}=1 \text { with } t>0
$$

2. Find the specific solution to the following initial value problem:

$$
y^{\prime}-2 t=\cos (t) \text { with } y(\pi)=1
$$

3. Find the specific solution to the following initial value problem. Notice that this is really one explicit DE then another; first find $y^{\prime}$ and then find $y$.

$$
y^{\prime \prime}+3=0 \text { with } y^{\prime}(-1)=2 \text { and } y(-1)=5 .
$$

4. The following DE is not explicit but can be factored, resulting in two explicit DEs. Do this and then solve:

$$
\left(y^{\prime}\right)^{2}-t y^{\prime}-2 t^{2}=0
$$

5. Find the interval of existence of the solution to the IVP:

$$
f^{\prime}(x)=\frac{7}{x^{2}-7 x} \text { with } y(3)=5
$$

6. Consider the first-order non-explicit DE:

$$
y^{\prime}=\frac{e^{t}}{\cos y}
$$

(a) Show that the general function $y=\sin ^{-1}\left(e^{t}+C\right)$ is a solution to this for every constant $C$.
(b) Find the specific solution satisfying $y(0)=\frac{\pi}{2}$.
(c) Find the specific solution satisfying $y(\ln 2)=\frac{\pi}{4}$.

