

Millersville University
Department of Mathematics

Name _____

MATH 365, *Ordinary Differential Equations*, Homework 01
August 27, 2008

Please answer the following questions covering topics you learned in calculus courses. Answers without justifying work will receive no credit. Partial credit will be given as appropriate, do not leave any problem blank. Each problem is worth 10 points. Your completed assignment is due at class time on Friday, August 29, 2008.

1. Please evaluate the following indefinite integrals.

(a) $\int x \sin(x^2) dx$

(b) $\int \frac{\ln(\ln x)}{x} dx$

(c) $\int \frac{1}{x(K-x)} dx$, where $0 < x < K$.

(d) $\int 3xe^{x/4} + 2e^{x/4} \sin 2x dx$

(e) $\int \frac{(\arctan x)^5}{1+x^2} dx$

2. Assuming that y is implicitly a function of x , find the following derivative:

$$\frac{d}{dx} (y \sin x + x^2 e^y - y).$$

3. Use a sum or difference of angles formula to write the sum of trigonometric expressions

$$\frac{1}{2} \cos(2t) + \frac{\sqrt{3}}{2} \sin(2t)$$

in the form $A \cos(\omega t + \gamma)$. Clearly specify A , ω , and γ .

4. Determine the radius of convergence of the Maclaurin series

$$\sum_{n=0}^{\infty} \frac{x^n}{2^{n+1}}$$

5. Find the Taylor series expansion for $\ln(1 + x)$ centered at $c = 0$.

6. If the function $f(x)$ is defined as

$$f(x) = \sum_{n=0}^{\infty} a_n x^n$$

and has a positive radius of convergence, then find the power series for $f''(x)$.