Name: Date:

Worksheet 2, Math 10560

Times indicate the amount of time that you would be expected to spend on the problem in on an exam.

1. (4 min) Use implicit differentiation to find $\frac{dy}{dx}$ if

$$(\ln 2)(\ln y) = 2^{x+y}.$$

Simplify your answer as much as possible.

2. (4 min) Compute the following integral:

$$\int_0^{\frac{1}{4}\ln(3)} \frac{e^{4x}}{1+e^{4x}}\, dx.$$

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3. (2-3 mins) Fill in the blanks in the following:

$5^{\sin x} = e^{--------}$ $\ln((\cos x)^{\ln x}) = \_\_\_\_\_ \ln(\cos x)$ $\log_{10}(x^2) = \_\_\_\_\_ \ln x$

4. Differentiate the functions:

(a) (4 mins) $g(u) = (2^{(u+1)^2})^3$

(b) (4 mins) $f(x) = (\tan x)^{\ln x}$

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5. (3 mins) Evaluate the indefinite integral:

$$\int xe^{x^2+5}\,dx.$$

6. (4 min) A bacteria culture contains 300 cells initially and grows at a rate proportional to its size (grows exponentially). After 5 hours the population has increased to 600. When will the population reach 9,000?