Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has four (4) pages, including this one.
- Enter your answer in the box(es) provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

Page	**Max. points**	**Your points**
2	30	
3	40	
4	30	
Total	100	

Problem 1 (10 pts)**.** Use the limit definition of the derivative to compute $f'(x)$ for $f(x) = 2x - x^2$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$f'(x) =$ ☐

Problem 2 (10 pts)**.** Use implicit differentiation to compute y' if y is a function of x that satisfies $x^3 + y^2 = 4xy$.

$y' =$ ☐

Problem 3 (10 pts)**.** Use logarithmic differentiation to compute the derivative of the following function:

$$y = \frac{\cos^2 x \ln x}{\sqrt{9 + x^2} \tan x}$$

$y' =$ ☐

Find the derivative of the following functions:

Problem 4 (5 pts). $f(x) = 7x$

$f'(x) =$ ☐

Problem 5 (5 pts). $f(x) = 7x^{21}$

$f'(x) =$ ☐

Problem 6 (5 pts). $f(x) = 7(x^2 + 1)^{21}$

$f'(x) =$ ☐

Problem 7 (5 pts). $f(x) = e^x$

$f'(x) =$ ☐

Problem 8 (5 pts). $f(x) = e^x x^{21}$

$f'(x) =$ ☐

Problem 9 (5 pts). $f(x) = e^x(x^2 + 1)^{21}$

$f'(x) =$ ☐

Problem 10 (10 pts). $f(x) = e^x(x^2 + 1)^{21} \ln x$

$f'(x) =$ ☐

Problem 11 (5 pts). $f(x) = \sqrt{x}$

$f'(x) =$ ☐

Problem 12 (5 pts). $f(x) = \dfrac{1}{\sqrt{x}}$

$f'(x) =$ ☐

Problem 13 (5 pts). $f(x) = \dfrac{\pi}{\sqrt{x}}$

$f'(x) =$ ☐

Problem 14 (5 pts). $f(x) = \dfrac{\pi}{\sqrt{x}} \tan x$

$f'(x) =$ ☐

Problem 15 (10 pts). $f(x) = \dfrac{\pi}{\sqrt{x}} \tan(\pi x)$

$f'(x) =$ ☐