Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.

- The test has five (5) 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	20	
4	30	
5	20	
Total	100	

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

$$f'(x_0) = \lim_{h \to 0} \frac{f(x_0 + h) - f(x_0)}{h}$$

$$f'(2) = \boxed{}$$

Problem 2 (10 pts). Find an equation of the tangent line to the graph of $y = e^x \cos x$ at $x = 0$.

tangent line: $\boxed{}$

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

$$f(x) = \frac{x^{3/4}\sqrt{x^2 + 1}}{(3x + 2)^5}$$

$$f'(x) = \boxed{}$$

Find the derivative of the following functions:

Problem 4 (2 pts). $f(x) = 4x$

$$f'(x) = \boxed{}$$

Problem 5 (2 pts). $f(x) = 4x^{20}$

$$f'(x) = \boxed{}$$

Problem 6 (2 pts). $f(x) = 4(x^2 + 3)^{20}$

$$f'(x) = \boxed{}$$

Problem 7 (2 pts). $f(x) = 2^x$

$$f'(x) = \boxed{}$$

Problem 8 (2 pts). $f(x) = 2^x x^{20}$

$$f'(x) = \boxed{}$$

Problem 9 (5 pts). $f(x) = 2^x (x^2 + 3)^{20}$

$$f'(x) = \boxed{}$$

Problem 10 (5 pts). $f(x) = 2^x (x^2 + 3)^{20} \ln x$

$$f'(x) = \boxed{}$$

Problem 11 (2 pts). $f(x) = \sqrt{x}$

$$f'(x) = \boxed{}$$

Problem 12 (4 pts). $f(x) = \dfrac{1}{\sqrt{x}}$

$$f'(x) = \boxed{}$$

Problem 13 (6 pts). $f(x) = \dfrac{\pi}{\sqrt{x}}$

$$f'(x) = \boxed{}$$

Problem 14 (8 pts). $f(x) = \dfrac{\pi}{\sqrt{x}} \tan x$

$$f'(x) = \boxed{}$$

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

$$f'(x) = \boxed{}$$

Problem 16 (20 pts). Compute $\frac{dy}{dx}$ if $x^3 + y^3 = 6xy$. Find the tangent line to the curve at the point $(3, 3)$.

$$\frac{dy}{dx} = \boxed{}$$

tangent line: $\boxed{}$