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 $f'(x)$ for $f(x) = 2x - x^3$

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

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

Problem 2 (10 pts)**.** Find an equation of the tangent line to the graph of $y = e^x \sin x$ 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). $f(x) = 3x$

$f'(x) =$

Problem 5 (2 pts). $f(x) = 3x^{12}$

$f'(x) =$

Problem 6 (2 pts). $f(x) = 3(x^2 - 4)^{12}$

$f'(x) =$

Problem 7 (2 pts). $f(x) = 3^x$

$f'(x) =$

Problem 8 (2 pts). $f(x) = 3^x x^{12}$

$f'(x) =$

Problem 9 (5 pts). $f(x) = 3^x (x^2 - 4)^{12}$

$f'(x) =$

Problem 10 (5 pts). $f(x) = 3^x (x^2 - 4)^{12} \ln x$

$f'(x) =$

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 $x^3 + y^3 - 6xy = 8$. Find the tangent line to the curve at the point $(2, 0)$.

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

tangent line: $\boxed{}$