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.
- For multiple-choice questions, circle the answer you select. On the other problems, you should enter your answer in the box(es) provided.
- 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 at the right of each problem number.
- No books or notes may be used on this test. Calculators are allowed, provided they don't have a computer algebra system.

Page	**Max**	**Points**
2	30	
3	30	
4	20	
5	20	
Total	100	

Problem 1 (10 pts)**.** Find the derivative of the function $y = 7e^{8t+1}$.

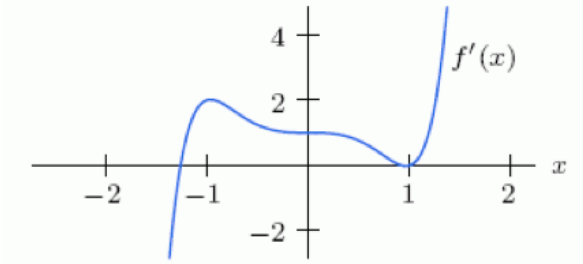
Problem 2 (10 pts)**.** Find the derivative of the function $y = 6 + \ln(3t + 2)$.

Problem 3 (10 pts)**.** If $f(x) = (3x + 6)(8x - 3)$, find $f'(x)$ and $f''(x)$.

Problem 4 (10 pts). Find the derivative of the function $f(x) = 8xe^x$.

Problem 5 (10 pts). Find the derivative of $z = \dfrac{9-t}{9+t}$,

Problem 6 (10 pts). The figure below is a graph of f'. Find the x–values that are critical points of the function f itself. Are they local maxima, local minima, or neither?



Problem 7 (10 pts)**.** Find an antiderivative $F(x)$ of $f(x) = 9x^4 + 22x + 2$ that satisfies $F(0) = 7$.

Problem 8 (10 pts)**.** Let $C(q)$ represent the cost, $R(q)$ the revenue, and $\Pi(q)$ the total profit, in dollars, of producing q items.

(a) If $C'(50) = 75$ and $R'(50) = 82$, approximately how much profit is earned by the 51^{st} item?

(b) If $C'(90) = 69$ and $R'(90) = 63$, approximately how much profit is earned by the 91^{st} item?

(c) If $\Pi(q)$ is a maximum when $q = 78$, how do you think $C'(78)$ and $R'(78)$ compare?

Problem 9 (10 pts)**.** Find the integral $\int 60e^{2x}\,dx$

Problem 10 (10 pts)**.** Find the integral $\int \frac{x}{3x^2+9}\,dx$.