

Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has six (6) pages, including this one.
- You have fifty (50) minutes to complete the exam.
- 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	
4	20	
5	20	
6	30	
Total	100	

Problem 1 (30 pts). Sketch on the next page the graph of the function $f(x) = \frac{x}{x-2}$.

Make sure to indicate clearly:

- Zeros of the function.
- Domain and Range
- Vertical and horizontal asymptotes.
- Extreme values and inflection points.
- Intervals of increase/decrease.
- Intervals of concavity.

Keep all the computations on this page

Problem 2. Use logarithmic differentiation to compute the derivative of the following functions:

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

(10 pts) $f(x) = (\sin x)^{\cos x}$

Problem 3 (10 pts). Find the critical values of the function $h(x) = \frac{x-2}{x^2+1}$. You **do not** have to indicate whether they are local maxima, local minima, or neither.

Problem 4 (10pts). Find the absolute maximum and absolute minimum **values** of the function $f(x) = 2x^3 - 6x^2 - 48x + 5$ on the interval $[-3, 5]$.

Problem 5. Compute the following limits:

(5pts) $\lim_{x \rightarrow 0^+} x \ln(x)$

(5pts) $\lim_{x \rightarrow \infty} \frac{1 - x - x^2}{5x^2 - 9}$

(10pts) $\lim_{x \rightarrow \infty} \left(1 - \frac{3}{x}\right)^{4x}$

(10pts) $\lim_{x \rightarrow \infty} x^{1/x}$