

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.
- 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	20	
5	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 (10 pts). Use the first or second derivative test to compute the local maxima and minima of the function $f(x) = x^{1/5} - x^{-4/5}$

Problem 3 (10). Find at least one critical point of the function $f(x) = 4x - \tan x$. You **do not** have to indicate whether they are local maxima, local minima, or neither.



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

Problem 6. Compute the following limits:

$$(5\text{pts}) \lim_{x \rightarrow \infty} \frac{1}{5x + 7}$$

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

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

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