

Math 131 - Quiz 10

November 12, 2025

Name key

Score _____

Show all work to receive credit. Supply explanations where necessary.

1. (3 points) Find the critical number(s) of
- $f(x) = 3x^4 + 4x^3 - 72x^2$
- .

$$f'(x) = 12x^3 + 12x^2 - 144x$$

$$= 12x(x^2 + x - 12)$$

$$= 12x(x+4)(x-3)$$

$$f'(x) = 0 \Rightarrow x = 0, x = -4, x = 3$$

ALL ARE DOMAIN INTERIOR PTS.

CRIT. #s : $x = 0, x = -4, x = 3$ $f'(x)$ DNE NOWHERE.

2. (3 points) Find the critical number(s) of
- $g(x) = \frac{x}{x+3}$
- .

DOMAIN OF $g = (-\infty, -3) \cup (-3, \infty)$, i.e., ALL REAL #s EXCEPT $x = -3$

$$g'(x) = \frac{(x+3) - x}{(x+3)^2} = \frac{3}{(x+3)^2}$$

No CRIT. #s

 $g'(x)$ DNE WHEN $x = -3$ ← NOT IN DOMAIN. $g'(x) = 0$ NOWHERE.

3. (4 points) Use calculus techniques to find the absolute extreme values of
- $f(x) = 3x^{2/3} - 2x$
- on
- $[-1, 2]$
- .

$$f'(x) = 2x^{-1/3} - 2 = \frac{2}{\sqrt[3]{x}} - 2$$

 $f'(x)$ DNE WHEN $x = 0$

$$f'(x) = 0 \Rightarrow \sqrt[3]{x} = 1$$

$$\Rightarrow x = 1$$

CRIT #s : $x = 0, x = 1$ BOUNDARY PTS : $x = -1, x = 2$

x	$f(x)$
0	0 ← Abs min
1	1
-1	5 ← Abs max
2	$3\sqrt[3]{4} - 4 \approx 0.76$