

Math 131 - Quiz 10

April 22, 2026

Name key

Score _____

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

1. (5 points) Use calculus techniques (showing all work) to determine the absolute maximum and minimum values of $f(x) = 3x^4 + 4x^3 - 12x^2 + 10$ on $[-3; 2]$.

$$\begin{aligned} f'(x) &= 12x^3 + 12x^2 - 24x \\ &= 12x(x^2 + x - 2) \\ &= 12x(x+2)(x-1) \end{aligned}$$

$f'(x)$ DNE NOWHERE ON $(-3, 2)$

$$\begin{aligned} f'(x) = 0 &\Rightarrow x = 0, \\ &x = -2 \\ &x = 1 \end{aligned}$$

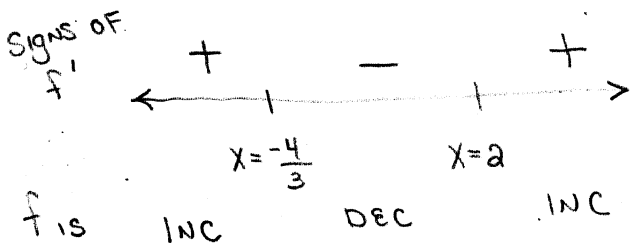
x	f(x)	
-3	37	
2	42	← ABSOLUTE MAX
0	10	
-2	-22	← ABSOLUTE MIN
1	5	

2. (5 points) Let $f(x) = x^3 - x^2 - 8x + 12$. Use calculus techniques (showing all work) to determine open intervals on which f is increasing/decreasing. Also identify all relative extreme values.

$$f'(x) = 3x^2 - 2x - 8 = (x-2)(3x+4)$$

$f'(x)$ DNE NOWHERE

$$f'(x) = 0 \Rightarrow x = 2, x = -\frac{4}{3}$$



f IS INCREASING ON
 $(-\infty, -\frac{4}{3}) \cup (2, \infty)$
 f IS DECREASING ON
 $(-\frac{4}{3}, 2)$
 $f(-\frac{4}{3}) = \frac{500}{27}$ IS A REL MAX.
 $f(2) = 0$ IS A REL MIN.