# Quiz 9

NAME:
PERM:
SECTION: T 8 AM / T 4 PM / T 5 PM / T 6 PM / TH 6 PM

**1.** Consider the function $f(x) = x^4 - 2x^2 + 1$ on the interval $[-1, 2]$.
(a) Find the absolute maximum value of $f(x)$ on this interval. At what $x$-value(s) does this absolute maximum occur?
(b) Find the absolute minimum value of $f(x)$ on this interval. At what $x$-value(s) does this absolute minimum occur?

$f'(x) = 4x^3 - 4x = 4x(x^2 - 1) = 0$ (never undefined)

Critical values: $x = 0$ $x = -1, 1$

$f(0) = 1$

$f(-1) = (-1)^4 - 2(-1)^2 + 1 = 1 - 2 + 1 = 0$

$f(1) = 1 - 2 + 1 = 0$

Endpoints: $f(2) = 16 - 8 + 1 = 9$ and $f(-1) = 0$.

So the absolute max is 9, when $x = 2$,
and the absolute min is 0, when $x = \pm 1$.

(c) What does the Mean Value Theorem tell us about $f(x)$ on this interval?

Since f is continuous on $[-1, 2]$ and differentiable on $(-1, 2)$, the MVT says that there is some number c in $(-1, 2)$ so that

$f'(c) = \frac{f(2) - f(-1)}{2 - -1} = \frac{9 - 0}{3} = 3.$