

Name: Solutions

Section: \_\_\_\_\_

1 \_\_\_\_\_ 3 \_\_\_\_\_ 5 \_\_\_\_\_ 7 \_\_\_\_\_ 9 \_\_\_\_\_

2 \_\_\_\_\_ 4 \_\_\_\_\_ 6 \_\_\_\_\_ 8 \_\_\_\_\_ 10 \_\_\_\_\_ Total \_\_\_\_\_

**IMPORTANT:** All answers must include either supporting work or an explanation of your reasoning. These elements are considered part of the answer and will be graded.

1. (10 pts) For each part, if the statement is always true, circle the printed capital T. If the statement is sometimes false, circle the printed capital F. In each case, write a careful and clear justification or a counterexample.

(a) If  $g(x) = f^{-1}(x)$  then  $g'(x) = (-1)f^{-2}(x)$ .

(a) T  F

Justification:

chain rule, have to have  $f'$  multiplying everything

b) If  $f$  is a differentiable function with at least three zeros then there must be at least two points where  $f$  has horizontal tangent lines.

(b)  T F

Justification:

mean value theorem

c) If  $f'(p) = 0$  then  $f$  has a local minimum or local maximum at  $x = p$ .

(c) T  F

Justification:

e.g.  $f(x) = x^3$

d) A continuous function defined on a closed interval always attains a maximum value on that interval.

(d)  T F

Justification:

extreme value theorem

e) A quadratic function has just one inflection point.

(e) T  F

Justification:

None