309 Worksheet 1.2

State hypothesis and conclusion in the following theorems from calculus:

(1) *Theorem:* Suppose that the function f is continuous on the closed interval $[a, b]$. Then $f(x)$ assumes every value between $f(a)$ and $f(b)$.

Hypothesis:

Conclusion:

(2) *Theorem:* If n is a positive integer and if $a > 0$ for even values of n then

$$\lim_{x \to a} \sqrt[n]{x} = \sqrt[n]{a}.$$

Hypothesis:

Conclusion:

(3) *Theorem:* Let C be a piecewise smooth simple closed curve that bounds the region R in the plane. Suppose that the functions $P(x, y)$ and $Q(x, y)$ are continuous and have continuous first-order partial derivatives on R. Then

$$\oint_C P dx + Q dy = \iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) dA.$$

Hypothesis:

Conclusion:

(4) *Theorem:* If f is differentiable at c and is defined on an open interval containing c and if $f(c)$ is either a local maximum value or a local minimum value of f, then $f'(c) = 0$.

Hypothesis:

Conclusion:

(5) *Theorem:* Suppose that a function g has a continuous derivative on $[a, b]$ and that f is continuous on the set $g([a, b])$. Let $u = g(x)$. Then

$$\int_a^b f(g(x))g'(x)dx = \int_{g(a)}^{g(b)} f(u)du.$$

Hypothesis:

Conclusion:

(6) *Theorem:* Suppose that the function f is defined on the open interval I and that $f'(x) > 0$ for all x in I. Then f has an inverse function g, the function g is differentiable, and

$$g'(x) = \frac{1}{f'(g(x))}$$

for all x in the domain of g.

Hypothesis:

Conclusion: