Math 140, Jeffrey Adams
Test III Review April 9, 2010

1. Section 4.1

    (a) Finding maxima and minima

    (b) critical points

    (c) extreme values on an interval

2. Section 4.2: Mean Value Theorem

3. Section 4.3: Consequences of the MVT

    (a) $f'(x) = 0$ implies $f(x) = c$

    (b) $f'(x) = g'(x)$ implies $f(x) = g(x) + c$

    (c) antiderivative

    (d) increasing and decreasing functions $(f'(x) > 0, f'(x) < 0)$

4. Section 4.3: Exponential Growth and Decay

    (a) $f'(t) = kf(t)$ then $f(t) = Ce^{kt}$ $(C = f(0))$

    (b) radioactive decay

5. Section 4.5: First and Second Derivative Tests

    (a) relative max and min

    (b) first derivative test $(f'(x)$ changes sign implies max or min)

    (c) second derivative test $(f'(x) = 0$: $f''(x) > 0$ implies min, $f''(x) < 0$ implies max)

6. Section 4.6: Extreme Values on an Arbitrary Interval

    (a) key setting: $f(x)$ has only one critical value on an interval

    (b) applications: surface area, baloons, ships passing in the night...

7. Section 4.7: Concavity and Inflection Points

    (a) concave up: $f''(x) > 0$, concave down: $f''(x) < 0$

    (b) inflection point: $f''(x)$ changes sign

8. Section 4.8: Limits at infinite

    (a) $\lim_{x \to \pm \infty} f(x)$

9. Section 4.9: Graphing

    (a) Table 4.1

    (b) using intercepts, max/min, concavity, inflection point, asymptotes to graph functions