1. Use the limit definition of derivative to show the following:

(i) If \( u(x) = \sqrt{g(x)} \) then \( u'(x) = \frac{g'(x)}{2\sqrt{g(x)}} \).

(ii) If \( v(x) = f(x^2) \) then \( v'(x) = f'(x^2)2x \).

(iii) If \( w(x) = f(g(x)) \) then \( w'(x) = f'(g(x))g'(x) \).

2. Use the rules for differentiating functions to find the following derivatives:

(i) Find \( f'(x) \) where \( f(x) = 3x^4 + x^3 + x^2 + 17x - 5 \).

(ii) Find \( g'(x) \) where \( g(x) = \frac{x^2 - 1}{x^2 + 1} \).

(iii) Find \( u'(x) \) where \( u(x) = \frac{1}{\sqrt{\sin(x)}} \).

(iv) Find \( v'(x) \) where \( v(x) = \cos(x^2) \).

(v) Find \( w'(x) \) where \( w(x) = \sin(x - 1) \cos(x + 1) \).

3. Work problems 1, 2, 8 13 from Lang page 56.

4. Work problems 3, 5, 10 from Lang page 56.

5. Work problems 27, 38, 40, 44, 55, 56 from Ayres and Mendelson page 87.