

- Routine problems:

§8.2. Problems. 3, 4, 22, 23, 25, 27, 36, 41, 46, 52.

§8.3. Problems. 5, 11, 14, 40, 48, 53.

§8.4. Problems. 1, 7, 9, 13, 33, 47

§8.5. Problems. 3, 7, 8, 10, 25, 27, 33, 34, 37.

§8.7. Problems. 1, 5, 13, 17, 25

- To hand in:

- (1) By the Fundamental Theorem of Calculus, if f has a continuous first derivative on the interval $[a, b]$ then

$$f(b) = f(a) + \int_a^b f'(x) dx.$$

- (a) Now assume that f has a continuous second derivative on $[a, b]$, and apply integration by parts to the integral above to derive the identity

$$f(b) = f(a) + f'(a)(b - a) + \int_a^b f''(x)(b - x) dx$$

- (b) Finally assume that f has a continuous third derivative on $[a, b]$ and apply integration by parts once more to derive the identity

$$f(b) = f(a) + f'(a)(b - a) + \frac{f''(a)}{2}(b - a)^2 + \frac{1}{2} \int_a^b f'''(x)(b - x)^2 dx.$$

- (2) Evaluate the integral $\int \frac{x^2}{(x^2 + 4x + 5)^{3/2}} dx$

- (3) Evaluate the integral $\int \frac{4 \arctan x}{(x + 1)^3} dx$.