Math 2423 homework

29. (4/19) Suppose that $f(x)$ is a function whose third derivative $f^{(3)}(x)$ exists and is continuous. Define $E_2(h)$ by the formula $f(a+h) = f(a) + f'(a)h + \frac{1}{2!}f''(a)h^2 + E_2(h)$.

    1. Use integration by parts to calculate that $E_2(h) = \displaystyle\int_0^h \tfrac{1}{2!}(h-t)^2\, f^{(3)}(a+t)\, dt$.
    2. Let m be the minimum and M the maximum of $f^{(3)}$ on the interval $[a, a+h]$. Show that $\frac{1}{3!}h^3\, m \le E_2(h) \le \frac{1}{3!}h^3\, M$.
    3. Use the Intermediate Value Theorem to show that there exists c in $[a, a+h]$ so that $E_2(h) = \frac{1}{3!}f^{(3)}(c)\, h^3$.

30. (4/19) 8.2 # 6, 7, 11, 13, 19, 20, 29, 36, 41, 42, 43, 46, 60, 61

31. (4/19) 8.3 # 5, 7, 10, 18, 23, 26, 29, 32, 33

32. 8.4 # 1, 2, 5, 6, 9, 17, 23, 25, 34, 37

33. 8.6 # 5-7, 13, 15, 19, 27, 28, 31, 32

34. 8.7 # 21(c) (S_n only)

35. 8.8 # 5, 7, 11, 15, 20, 21, 27, 32, 35, 55, 57, 61

36. 9.1 # 5, 7, 10-13

37. 9.2 # 5, 8, 9, 15, 16, 25