In Exercises 38 – 49, determine the intervals on which each function is **a.** *concave upward* and **b.** *concave downward; then* **c.** *locate all points of inflection. Use the information gathered to sketch the function. Confirm the details with a graphing calculator.*

38. $f(x) = 2x^2 + 5x - 9$

39. $f(x) = 5x^2 + 8x - 1$

40. $f(x) = x^3 - 3x^2 + 7$

41. $f(x) = x^3 + 6x^2 - 10$

42. $f(x) = x^3 + 11x - 4$

43. $f(x) = 5x^3 + 7x + 2$

44. $f(x) = \dfrac{1}{3}x^3 - 2x^2 + x - 3$

45. $f(x) = \dfrac{1}{3}x^3 + 3x^2 + 2x - 5$

46. $f(x) = \sqrt[3]{2x + 3}$

47. $f(x) = \sqrt[3]{5x - 3}$

48. $f(x) = \dfrac{x}{x^2 - 4}$

49. $f(x) = \dfrac{4x}{x^2 - 5}$

In Exercises 50 – 63, use the Second Derivative Test to find all local extrema, if the test applies. Otherwise, use the First Derivative Test.

50. $f(x) = x^2 - 3x + 5$

51. $f(x) = 8 + 7x - 2x^2$

52. $f(x) = x^3 - 3x^2 + 8$

53. $f(x) = x^3 + 6x^2 - 10$

54. $f(x) = x^3 - 12x + 3$

55. $f(x) = x^3 - 3x + 4$

56. $f(x) = \dfrac{2}{3}x^3 - x^2 - 4x - 2$

57. $f(x) = \dfrac{1}{3}x^3 + x^2 - 3x - 1$

58. $f(x) = x^4 - 8x^2 + 7$

59. $f(x) = x^4 - 2x^2 + 3$

60. $f(x) = x^4 + 2x^3 - 4$

61. $f(x) = x^4 - 6x^3 + 8$

62. $f(x) = 2x + \dfrac{8}{x}$

63. $f(x) = \dfrac{x^2 + 9}{x}$