Answers to Even-Numbered Exercises

Exercises 4.1

4. critical points: -1,0,2,
increasing on: $(-1, 0)$ and $(2, \infty)$
decreasing on: $(-\infty, -1)$ and $(0, 2)$
local min at: x=-1, x=2
local max at: x=0

6. critical point: 1
increasing on: $(1, \infty)$
decreasing on: $(-\infty, 1)$
local min: x=1
local max: none

14. critical points: 0
increasing on: $(-2, 0)$
decreasing on: $(0, 2)$
local min: none
local max: x=0

critical points:
increasing on:
decreasing on:
local min:
local max:

26. (a) there's a global max at $t = 10$, and $s'(10) = 0$
(b) positive
(c) negative
(d) false

28. d, final answer

32. (a) $(-\infty, 0)$, $(0, 1)$, and $(2, \infty)$
(b) (1,2)
(c) 0,1,2
(d) x=1
(e) x=2

48. There's a global max at $x = \frac{1}{2}$.

Exercises 4.2

4. (d)

14. (e)

16. (j)

22. concave down on $(-\infty, -2)$
concave up on $(-2, \infty)$
no inflection point

32. concave down on $(-\infty, 0)$
concave up on $(0, \infty)$
inflection point at x=0

40. $x = e^{-1/2}$ is a critical point and local minimum, with $f(e^{-1/2}) = -\frac{1}{2e}$.

42. x=0 is a critical point and local minimum, with f(0) =0.

46. (a) global maximum: $t = 2$ (i.e. the 2nd day)
(b) $r(t)$ is increasing, concave up on (0,2), and concave down on (2,4)
inflection point: $t = 2$

48. x=0 is a critical point and local maximum. (Note: f"(0)=0, so the second derivative test is inconclusive.)
x=2 is a critical point and local minimum (using f"(2) > 0).

52. (a) global max: 1999
global min: 1940
(b) concave down: 1913 to 1940, and 1940 to 1970
concave up: 1970 to 1999
(c) inflection point: 1970

Exercises 4.3

All answers should be in form of graph. You can check them with a graphing calculators. For numbers 1, 4, and 7, there are different possible graphs.

Exercises 4.4

4. Maximum value of 5 at x=1. Minimum value of 2.75 at x=-.5.

6. Maximum value of 0.25 at x=2. Minimum value of -0.25 at x=-2.

28. Global maximum value of -1 at x=0. No global minimum.

32. $R(S)$ is increasing on $(0, \frac{1}{b})$ and decreasing on $(\frac{1}{b}, \infty)$. Therefore, there's a global maximum at $S = \frac{1}{b}$.

Exercises 4.5

2. p=200 will maximize revenue

4. p= \$19.50 will maximize revenue

12. $A = xy + 5x + 4y + 20$
$xy = 180$
dimensions of the printed area are $x = 12$ and $y = 15$
(dimensions of the entire poster are 16 in by 20 in)

28. P should be located $\frac{\sqrt{2}}{2}$ miles away from A.

30. The house should be built 4.7 miles away from A.