

1. Sketch the graphs of the following linear functions:

- (a) $f(x) = x - 2$
- (b) $f(x) = 2x$
- (c) $f(x) = -x + 2$
- (d) $f(x) = \frac{x+2}{2}$

2. Sketch the graphs of the following quadratic functions:

- (a) $f(x) = (x-2)(x-4)$
- (b) $f(x) = x(x-6)$
- (c) $f(x) = x^2 - 6$

3. State the zeros and sketch the graph of each of the following functions. For what values of x is $f(x)$ positive? Negative?

- (a) $f(x) = x^2 - 7x + 12$
- (b) $f(x) = x^3 - 1$
- (c) $f(x) = (x-2)(x+3)(x-4)$

4. Sketch the graphs of the following functions. For what values of x are these functions undefined?

- (a) $f(x) = \sqrt{2x-5}$
- (b) $f(x) = \sqrt{1-x^2}$

5. (a) $P(x)$ is a polynomial, the equation $P(x) = 0$ has roots at $-2, 1$, and 3 , and the graph of $y = P(x)$ has a y -intercept of 4 . Find an expression for $P(x)$.

(b) Find an expression for $P(x)$ if -2 in part (a) is a double root.

6. Are the following even or odd functions? Sketch the graph of each function, taking its symmetry into account.

(a) $y = -2x^2 + 1$

(b) $y = x^3 + 3x$

(c) $y = \frac{-2x}{x^2+1}$

(d) $y = \frac{3}{x^3+3}$

7. How are the following functions related? Sketch their graphs.

(a) $y = \frac{1}{x}$ and $y = \frac{1}{x-2}$

(b) $y = \frac{1}{x}$ and $y = \frac{1}{x-2}$

8. Find the asymptotes and sketch the graphs of:

(a) $y = \frac{1}{(2x-1)^2}$

(b) $y = \frac{4x}{(x-2)(x+1)}$

(c) $y = \frac{x-1}{(x+2)(x-3)}$

(d) $y = \frac{2x^2-1}{x^2}$

9. Sketch the following functions:

(a) $y = x + \frac{1}{x}$

(b) $y = \frac{4}{2x+3}$

(c) $y = \frac{2x^2}{x^2+3}$

(d) $y = x^2 - \frac{1}{x}$

(e) $y = \frac{x}{(x-2)^2}$

(f) $y = \frac{x}{\sqrt{x^2+9}}$

(g) $y = \frac{x^2}{x^2-1}$

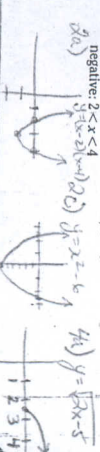
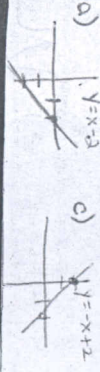
Answers to Exercises

Exercise 1.1, Page 12

- (a) 1, 2 (b) 3, 1, 2
- 0
- $y = 2x - 5$
- (a) 11 (b) 20, between 11 and 20, 155
- (a) 284 (b) 28.9
- 105 km/h
- no, actual speed fluctuates about the average
- (a) $\frac{\sqrt{2}}{2}$ (b) $\frac{1}{\sqrt{2}}$
- (a) $5\sec^2(5x)$ (b) $\frac{1}{2}\sec^2(\frac{1}{2}x)$
- (a) $x^{-1} + C$ (b) $\frac{2}{3}x^{3/2}$ (c) $\frac{1}{3.5}x^{3.5}$
- (a) $\frac{1}{2}\sin(4x) + C$ (b) $-3\sin(\frac{1}{3}x) + C$
- rate of change of height at age 6
yes, because at different times in one's life the rate of growth is different
- length decreases
area increases then decreases
- the 5×5 square
- 5.66, 6.00, 6.21, 6.26, 6.28
- (a) 1382.3 cm³ (b) overestimates the volume
- (c) use more disks
- (a) 11.1 (b) underestimate
- (c) use more line segments
- (a) 1.25 m, 0.625 m, 0.3125 m
(b) 8.75 m, 9.375 m, 9.6875 m
(c) There is no last jump.

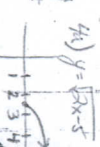
Exercise A, Page 27

- (a) $32x^{-4}$ (b) $-4x^{-2}$ (c) $12x^{-2}$ (d) $12x^{-2}$
- (a) $(x-12)(x+2)$
- (a) $(x-8)(x+8)$
- (a) $(x-2)(x+2)(x-3)(x+3)$
- (a) $6x^2 - 5(x+2)(x-3)(x+3)$
- (a) $(x-8)(2x+1)(2x-1)$
- (a) $(x+1)(x^2-5)(x+1)$
- (a) $7(2x-1)(4x^2+4x+1)$
- (a) $2x\sqrt{2x}$ (b) $(x^2+5)\sqrt{x-2}$
- (a) $2\sqrt{x+1} + \sqrt{x}$
- (a) $-5/2$ (b) $-\frac{3}{2}$ (c) -2 (d) $-\frac{1}{2}$



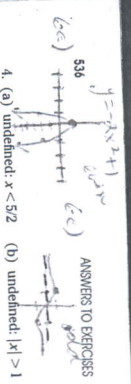
Exercise B, Page 36

- (a) zeros: 3, 4
(b) positive: $x < 3$, $x > 4$
(c) zeros: -3, 2, 4
positive: $x < -3$, $-3 < x < 2$, $x > 4$
negative: $2 < x < 4$
- (a) zeros: 1, 2
(b) positive: $x > 1$
(c) zeros: -3, 2, 4
positive: $x < -3$, $-3 < x < 2$, $x > 4$
negative: $2 < x < 4$



Exercise C, Page 38

- (a) 25, 0.9 (b) -4, -4, 14
(c) -0.6, 0.8, 0.1980198
 - (a) 1.2, 3.162278, 7
(b) 0.5, 0.7071068, 0.8660254 (c) 4, 2, 0, 2
 - (a) division by zero error
(b) illegal quantity error
(c) overflow error (the computer cannot hold a number this large)
 - (a) in steps of 1: (b) in steps of 2:
- | x | y | x | y |
|----|-----|----|------|
| -2 | -24 | -4 | -64 |
| -1 | 8 | -2 | -8 |
| 0 | 6 | 0 | 0 |
| 1 | 0 | 2 | 2 |
| 2 | -4 | 4 | 0.25 |
| 3 | 0 | | |
| 4 | 18 | | |



Exercise 2.1, Page 47

- (a)

x	f(x)
5.1	-12.99
5.01	-12.9999
5.001	-12.999999
5.0001	-12.99999999

(b) -13 (c) -13
- the limit exists:
 $\lim_{x \rightarrow 2} f(x) = x - 2$, $f(x) = 8$
- (a) 0 (b) 9 (c) not defined (d) 4 (e) 0



Exercise 2.2, Page 51

- (a) 1/3 (b) 8/3 (c) -25/3 (d) -1/3
- (a) 3 (b) 8 (c) 5 (d) -5 (e) 1
- (a) 4 (b) 8 (c) -1 (d) 1/d^2
- (a) 1 (b) 0 (c) 1/6 (d) 1/(2/3)
- (a) 1 (b) 0 (c) 2/5 (d) 2/\sqrt{2}
- (a) -2 (b) 4 (c) 4
- (a) 6 (b) -1 (c) 42 (d) 2\sqrt{3}

Exercise 2.3, Page 55

- step function, not continuous
- continuous
- discontinuous
- (a) condition 2: limit does not exist.
(b) condition 1: value of function is indeterminate.
(c) condition 3: value of limit \neq value of function.
(d) conditions 1 and 2; asymptote.
(e) condition 2: limit does not exist.
(f) condition 1: function not defined.
(g) condition 2: limit does not exist.
- (a) continuous
(b) discontinuous at $x = 2$
(c) discontinuous at $x = 0$
(d) discontinuous at $x = 0$ and $-1/3$
(e) discontinuous at $x = -1$
(f) discontinuous at $x = 0$
(g) discontinuous at $x = -3$ and 1
- (a) $f(x) = a + 1$
(b) $f(x) = a + 1$
- define $f(-3) = -8$

Exercise 2.4, Page 57

- $x = 6.0156$
- (a) $x = 2.3$, -5
(b) $x = 2.5$, $\sqrt{2}$
- $x = 2.914214$, 0.0857864

Exercise 2.5, Page 59

- (a) 1/3 (b) 8/3 (c) -25/3 (d) -1/3
- (a) 3 (b) 8 (c) 5 (d) -5 (e) 1
- (a) 4 (b) 8 (c) -1 (d) 1/d^2
- (a) 1 (b) 0 (c) 1/6 (d) 1/(2/3)
- (a) 1 (b) 0 (c) 2/5 (d) 2/\sqrt{2}
- (a) -2 (b) 4 (c) 4
- (a) 6 (b) -1 (c) 42 (d) 2\sqrt{3}

