

Problem Set #4

10/4/04

1.3, # 6, 14, 15, 32, 46

2.1, # 1

2.2, # 3

Problem 6.

Section 1.3

- (a) $-2 \leq x \leq 3$,
- (b) no
- (c) highest value at $x = -3$, lowest value at $x = -5$
- (d) 3
- (e) -2
- (f) $x = -4, x = -1, x = 2, x = 3$
- (g) -1
- (h) 0
- (i) $g(\pi) \approx 0.2, g(-\pi) \approx -2.8$
- (j) $x \approx -3.9, x \approx -1.3, x \approx 2.8$
- (k) $-5 \leq x \leq -4.8$

Problem 14.

- (a) yes
- (b) yes
- (c) no
- (d) no
- (e) no
- (f) yes
- (g) no

Problem 15.

e.g. f like in problem 14f, g like in problem 14b.

Problem 32.

Using the condition that $h(0) = g(0)$ and that the dashed graph and the increasing solid graph are the only two graphs that meet at $x = 0$, these graphs are the graphs h and g . Using the second condition that $h(x) > g(x)$ for $x < 0$, we conclude that the dashed graph is the graph of h and the increasing solid graph is the graph of g . Hence the dashed and dotted graph and the other solid graph are the graphs of f and j . Notice that $f(x) \leq 0$ and $j(x) \leq 0$ for $x > 0$. The fourth condition that $j(x) = 2f(x)$ for $x > 0$ implies that $j(x) \leq f(x)$ for $x > 0$, from which we conclude that the dashed and dotted graph to be the graph of j , which lies below the graph of f and the remaining graph to be that of f . (Although the third condition is consistent with other conditions and the graphs, it is superfluous.)

Problem 46.

We use the distance formula $d = rt$, which expresses the distance d traveled at a constant rate r for a time period of duration t in terms of r and t . The commuter first bikes to the train station at a rate of B miles per hour. He travels X miles, so the ride takes $\frac{X}{B}$ hours. Next, the commuter waits w hours for the subway. The subway ride takes R minutes or $\frac{R}{60}$ hours. Finally, the commuter walks Y miles at $\frac{M}{H}$ miles per hour, taking $\frac{YH}{M}$ hours. Let $T(w)$ be the total time of the commute as a function of w . Adding the durations of the individual stages of the commute, we can express the total time of the commute as $T(w) = \frac{X}{B} + w + \frac{R}{60} + \frac{YH}{M}$ hours.

Section 2.1

Problem 1.

- (a) h and j
- (b) g and i
- (c) h and i
- (d) g and j
- (e) f, h , and i

Section 2.2

Problem 3.

- (a) (i) 2
- (ii) $x - 3$, if $x \geq 3$; $-x + 3$, if $x < -3$.
- (b) (i) $|-5 - \pi|$
- (ii) $|\sqrt{3} - \pi|$
- (b) (ii) x is more than 2 units from 3
- (iii) $|c| < |b|$
- (iv) x is at most 4 units from 3
- (v) $|w - 2| = 6$
- (vi) $|q - 5| \leq 18$