

1. $h(x) = \sqrt{x^2 + 2}$ and $g(t) = t^2$ If $h(u) = f \circ g(u)$,
then $f(t) = \underline{\hspace{2cm}}$.

[Note: $f \circ g(u)$ is another notation for $f(g(u))$.]

Start by drawing a *function machine diagram* before starting your algebra.

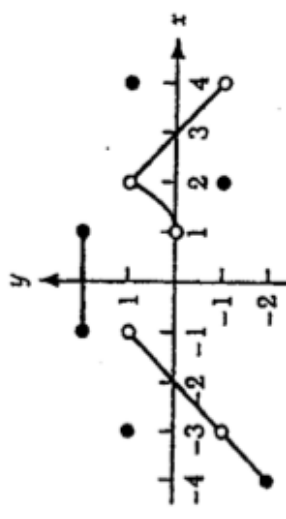
2. Things to discuss:

- (a) What is written on the post-it on your bathroom mirror? What does it mean geometrically? What does it mean verbally?
- (b) The fundamental objects that we deal with in calculus are: $\underline{\hspace{2cm}}$. [I'm looking for a one word answer, but you should discuss why your response is appropriate.]
- (c) How do we *define* the constant e that is used in $\ln(x)$?
- (d) What is an *amount function*? What is a *rate function*?
- (e) What are the ideas behind *Seven Easy Pieces*?
- (f) What other concepts might appear on tomorrow's test?

1. Let $f(x) = \begin{cases} 1, & \text{if } x \text{ is an integer} \\ 2, & \text{if } x \text{ is not an integer.} \end{cases}$
 - (a) Draw a graph of f over the interval $[0, 5]$.
 - (b) Evaluate $\lim_{x \rightarrow 4} f(x)$.
 - (c) Evaluate $\lim_{x \rightarrow 5/2} f(x)$.
 - (d) For which values of a does $\lim_{x \rightarrow a} f(x)$ exist? Why?

Let f be the function whose graph is shown below. Using the graph, evaluate each of the limits in Exercises 2-15 or explain why the limit does not exist. [NOTE: $f(1) = 2$.]

Graph of f

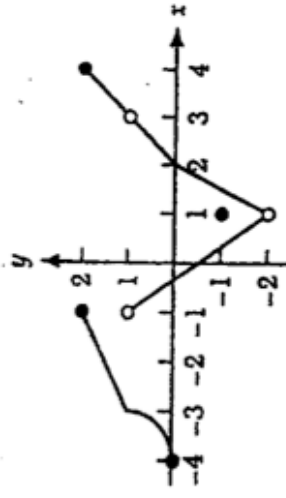


2. $\lim_{x \rightarrow 0} f(x)$
3. $\lim_{x \rightarrow -3} f(x)$
4. $\lim_{x \rightarrow -1} f(x)$
5. $\lim_{x \rightarrow 2^-} f(x)$
6. $\lim_{x \rightarrow 2^+} f(x)$
7. $\lim_{x \rightarrow 2} f(x)$
8. $\lim_{x \rightarrow -2^-} f(x)$
9. $\lim_{x \rightarrow 1^+} f(x)$

10. $\lim_{x \rightarrow -4^+} f(x)$
11. $\lim_{x \rightarrow 4^-} f(x)$
12. $\lim_{x \rightarrow 3} f'(x)$
13. $\lim_{x \rightarrow -1^+} f'(x)$
14. $\lim_{x \rightarrow -1^-} f'(x)$
15. $\lim_{x \rightarrow -3} f'(x)$

16. Over which intervals is f continuous? Let g be the function whose graph is shown below. Using the graph, evaluate each of the limits in Exercises 17-26 or explain why the limit does not exist.

Graph of g



17. $\lim_{x \rightarrow -4^+} g(x)$
18. $\lim_{x \rightarrow -3} g(x)$
19. $\lim_{x \rightarrow -2} g(x)$
20. $\lim_{x \rightarrow -1^+} g(x)$
21. $\lim_{x \rightarrow -1} g(x)$
22. $\lim_{x \rightarrow 0^-} g(x)$
23. $\lim_{x \rightarrow 1} g(x)$
24. $\lim_{x \rightarrow 2} g(x)$
25. $\lim_{x \rightarrow 3} g(x)$
26. $\lim_{x \rightarrow 4^-} g(x)$
27. Over which intervals is g continuous?