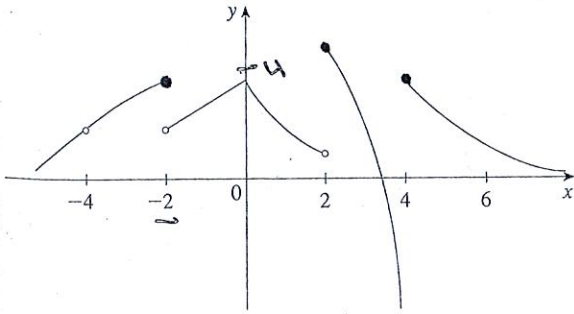


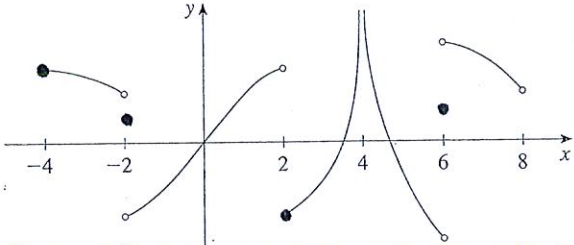
1. Write an equation that expresses the fact that a function f is continuous at the number 4. $f(4) = \lim_{x \rightarrow 4} f(x)$

2. If f is continuous on $(-\infty, \infty)$, what can you say about its graph? - defined everywhere - no discontinuities!

3. (a) From the graph of f , state the numbers at which f is discontinuous and explain why. $x=4$ removable $x=2$ jump
 (b) For each of the numbers stated in part (a), determine whether f is continuous from the right, or from the left, or neither. $x=-4$ neither $x=-2$ left $x=2$ right $x=4$ infinite jump



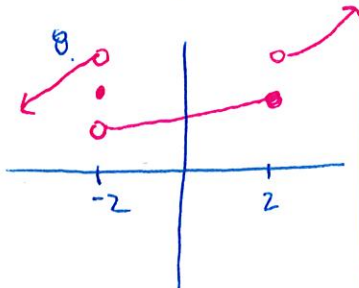
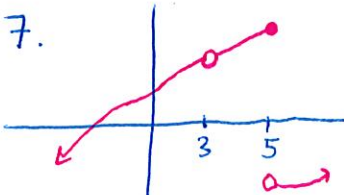
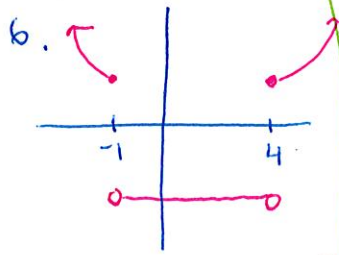
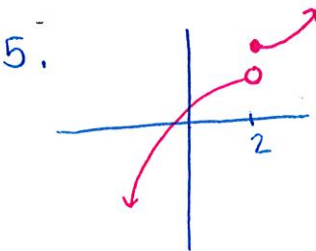
4. From the graph of g , state the intervals on which g is continuous.



$[-4, -2) \cup (-2, 2) \cup (2, 4) \cup (4, 6) \cup (6, 8)$

5-8 Sketch the graph of a function f that is continuous except for the stated discontinuity.

5. Discontinuous, but continuous from the right, at 2
 6. Discontinuities at -1 and 4, but continuous from the left at -1 and from the right at 4
 7. Removable discontinuity at 3, jump discontinuity at 5
 8. Neither left nor right continuous at -2, continuous only from the left at 2



9. The toll T charged for driving on a certain stretch of a toll road is \$5 except during rush hours (between 7 AM and 10 AM and between 4 PM and 7 PM) when the toll is \$7. See below

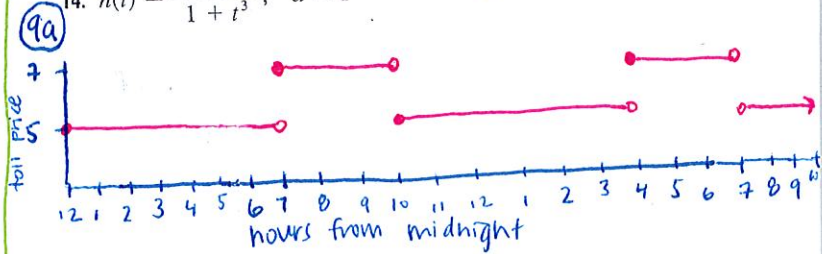
- (a) Sketch a graph of T as a function of the time t , measured in hours past midnight.
 (b) Discuss the discontinuities of this function and their significance to someone who uses the road.

10. Explain why each function is continuous or discontinuous.
 (a) The temperature at a specific location as a function of time **Continuous**
 (b) The temperature at a specific time as a function of the distance due west from New York City **Continuous**
 (c) The altitude above sea level as a function of the distance due west from New York City **discontinuous (think cliff!)**
 (d) The cost of a taxi ride as a function of the distance traveled **discont. (price jump)**
 (e) The current in the circuit for the lights in a room as a function of time **discontinuous (lights switched on and off)**

11. Suppose f and g are continuous functions such that $g(2) = 6$ and $\lim_{x \rightarrow 2} [3f(x) + f(x)g(x)] = 36$. Find $f(2)$.
 see below

12-14 Use the definition of continuity and the properties of limits to show that the function is continuous at the given number a .

12. $f(x) = 3x^4 - 5x + \sqrt{x^2 + 4}$, $a = 2$
 13. $f(x) = (x + 2x^3)^4$, $a = -1$
 14. $h(t) = \frac{2t - 3t^2}{1 + t^3}$, $a = 1$



9b. - jump discontinuities at hours 7:00, 10:00 am & 4:00, 7:00pm

- this is important someone on the toll road because at these times, the prices increase or decrease \$2!

11. given: $g(2) = 6 + \lim_{x \rightarrow 2} 3f(x) + f(x)g(x) = 36$

try substitution: $3 \lim_{x \rightarrow 2} 3f(x) + f(x)g(x) = 36$

$$3f(2) + f(2) \cdot 6 = 36$$

$$9f(2) = 36$$

$$f(2) = 4$$

Answers vary!