Analysis Honors
Review Worksheet
Limits & Continuity #4

Show that each of the following functions is either continuous or discontinuous at the given value of x.

1. f(x) = x + 5 at x = 1

Continuous

$f(1) = 6 = \lim_{x \to 1} (x + 5)$

2. f(x) = $x^2 + 2x - 1$ at x=0

Continuous

$f(0) = -1 = \lim_{x \to 0} (x^2 + 2x - 1)$

3. f(x) = $\frac{x^2 - 16}{x - 4}$ at x=4

Discontinuous

f(4) is undefined

4. f(x) = $\frac{x^2 - 25}{x + 5}$ at x=5

Continuous

$f(5) = 0 = \lim_{x \to 5} \frac{x^2 - 25}{x + 5}$

5. f(x) = [x] at x=2

Discontinuous

$\lim_{x \to 2} [x]$ DNE

6. f(x)= $\frac{|x + 1|}{x}$ at x=2

Continuous

$f(2) = \frac{3}{2} = \lim_{x \to 2} \frac{|x + 1|}{x}$

7. f(x) = $\frac{1}{x}$ at x=3

Continuous

$f(3) = \frac{1}{3} = \lim_{x \to 3} \frac{1}{x}$

8. f(x) = $\frac{3x - 1}{2x + 6}$ at x= -3

Discontinuous

f(-3) is undefined

State whether each function is continuous or discontinuous for all x. Justify you answer.

9. f(x) = $x^2 + 2$

Continuous

10. f(x) = $\frac{1}{x}$

Discontinuous at x = 0
f(0) is undefined
Infinite Discontinuity

11. $f(x) = \dfrac{x^2 + 1}{x - 1}$

Discontinuous at x = 1
f(1) is undefined
Point discontinuity

12. $f(x) = |x - 1|$

Continuous
(Graph It!)

Each of the following has point discontinuity. Assign values to f(x) that remove the discontinuity.

13. $f(x) = \dfrac{x^2 - 4}{x - 2}$

Let f(2) = 4

14. $f(x) = \dfrac{x^2 - 5x + 6}{x - 2}$

Let f(2) = -1

15. $f(x) = \dfrac{x^2 - 5}{x - \sqrt{5}}$

Let $f(\sqrt{5}) = 2\sqrt{5}$

16. $f(x) = \dfrac{x^3 + 8}{x + 2}$

Let f (-2) = 12

Give the open interval(s) for which each function is continuous.

17. $f(x) = \dfrac{3x - 5}{2x^2 - x - 3}$

$(-\infty,-1)(-1,\frac{3}{2})(\frac{3}{2},\infty)$

18. $f(x) = \sqrt{2x - 3} + x^2$

$(\frac{3}{2},\infty)$