

INTRODUCTION TO CALCULUS

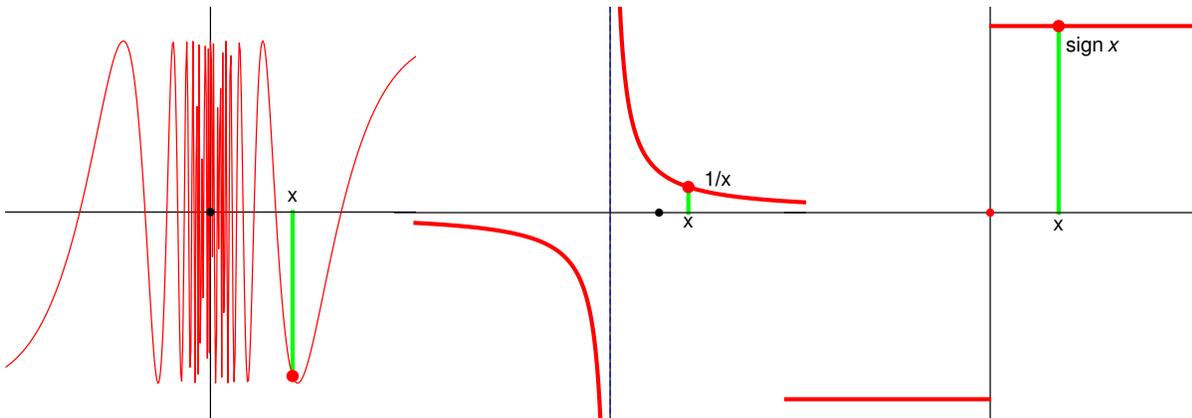
MATH 1A

UNIT 4: WORKSHEET

Jumping, Escaping or Oscillating

There are a few mechanisms for discontinuity . A function can jump for good, badly rush to infinity or have an ugly oscillation. All cases come from division by zero somewhere.

Nice Guys	Good,Bad,Ugly Guys
$x^2 + 4x + 6$	$1/x$ at 0
$\sin(x), \cos(x)$	$\tan(x)$ at $\pi/2$
$\exp(x)$	$\log x $ at 0
$\text{sinc}(x) = \frac{\sin(x)}{x}$	$\frac{1}{\cos(x)}$ at $\pi/2$



Surprises

$\sin(x)/x$	is continuous at 0
$1/\log x $	is continuous at 0
$x \sin(1/x)$	is continuous at 0

Which functions are continuous?

1: $f(x) = \log 2 + x^2$

2: $f(x) = \sqrt{|x|}$

3: $f(x) = |x^3|/x^3$

4: $f(x) = |x|^2/x^2$

5: $f(x) = \frac{1}{\sqrt{|x|}}$

6: $\frac{1}{\log|1/x|}$

7: $\log(\log|x|)$

8: $1/(1 + |x|)$

9: $1/(1 - |x|)$

10: $x^2/\sin(x)$