

Finding Limits numerically
By: Zaid Najjar

10/10

Name: Faisal Hussain Fernando Group: 403 Date: 15/12/17

Evaluate the following limits numerically:

- $\lim_{x \rightarrow 6} \frac{x^2 - 36}{x - 6} = \frac{(x+6)(x-6)}{x-6} = x+6 = 12$
- $\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x} = \frac{x(x-2)}{x} = x-2 = 0$
- $\lim_{x \rightarrow 2} \frac{x^2 + 8}{x + 2} = \frac{4+8}{4} = 3$
- $\lim_{x \rightarrow 2} \frac{x^2 + 3x - 10}{x - 2} = \frac{(x+5)(x-2)}{x-2} = x+5 = 7$
- $\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x - 3} = \frac{\frac{1}{\sqrt{x+1} + 2}}{x - 3} = \frac{1}{(x-3)(\sqrt{x+1} + 2)}$
- $\lim_{x \rightarrow 10} \frac{100 - x^2}{x - 10} = \frac{-(x-10)(x+10)}{x-10} = -(x+10) = -20$
- $\lim_{x \rightarrow 3} \frac{x^2 + 14x + 33}{2x + 6} = \frac{(x+11)(x+3)}{2(x+3)} = \frac{x+11}{2} = 7$
- $\lim_{x \rightarrow 1} \frac{2 + 2x^2}{x + 1} = \frac{2(1+1)}{1+1} = 2$
- $\lim_{x \rightarrow 5} \frac{x - 25}{\sqrt{x} - 5} = \frac{(x-25)(\sqrt{x} + 5)}{(\sqrt{x} - 5)(\sqrt{x} + 5)} = \frac{(x-25)(\sqrt{x} + 5)}{x - 25} = \sqrt{x} + 5 = 10$
- $\lim_{x \rightarrow 6} \frac{x^2 - 36x}{18 + 3x} = \frac{x(x-36)}{3(x+6)} = \frac{x(x-6)(x+6)}{3(x+6)} = \frac{x(x-6)}{3} = 24$

Answers:

- $\lim_{x \rightarrow 6} \frac{x^2 - 36}{x - 6} = 12$
- $\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x} = 0$
- $\lim_{x \rightarrow 2} \frac{x^2 + 8}{x + 2} = 3$
- $\lim_{x \rightarrow 2} \frac{x^2 + 3x - 10}{x - 2} = 7$
- $\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x - 3} = \frac{1}{4}$
- $\lim_{x \rightarrow 10} \frac{100 - x^2}{x - 10} = -20$
- $\lim_{x \rightarrow 3} \frac{x^2 + 14x + 33}{2x + 6} = 4$
- $\lim_{x \rightarrow 1} \frac{2 + 2x^2}{x + 1} = 6$
- $\lim_{x \rightarrow 5} \frac{x - 25}{\sqrt{x} - 5} = 10$
- $\lim_{x \rightarrow 6} \frac{x^2 - 36x}{18 + 3x} = 24$

Prepa Tec CALculus I Quiz # 18
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1. Estimate the given limit using a numerical approximation (15 pts)

x	-0.1	-0.01	-0.001	0	0.001	0.01	0.1
$f(x)$	0.513	0.501	0.500	0.5	0.499	0.498	0.488

2. Graph the following functions and find their limits.

$f(x) = \begin{cases} x+1 & x > -1 \\ x^2 & x \leq -1 \end{cases}$ (15 pts)

Find (20 pts)

- $\lim_{x \rightarrow -1^+} f(x) = 0$
- $\lim_{x \rightarrow -1^-} f(x) = 1$
- $\lim_{x \rightarrow -1} f(x) = \text{DNE}$
- $f(-1) = 1$

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Key Point: $y = 6$

Intersections: $y = 6$

Horizontal Line

Domain: all real #s

Range: $y \geq 6$

$y = x$ $y = 0$

Parabola

No Asymptotes

D: \mathbb{R}

R: $(-\infty, \infty)$

Key Points: $(0, 0)$

$y = x^2$ $y = x^3$

No Asymptotes

Key Points: $(0, 0)$

D: \mathbb{R}

R: $(-\infty, \infty)$

$y = \sqrt{x}$ $y = \sqrt[3]{x}$

Slope of Tangent Line Using Secant Line and Concept of Limits
By: Designing Team

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1. a) Sketch the graph of the function $f(x) = -x^2 + 4$

Find the slope of the secant line passing through the points P(1,3) and Q (given below)

b) Write the slopes in the following table:

$(x_1, -x_1^2 + 4)$	m	$(x_1, -x_1^2 + 4)$	m
(0, 4)	-1	(2, 0)	-4
(0.5, 3.75)	-1.5	(1.5, 1.75)	-2.5
(0.9, 3.19)	-1.9	(1.7, 2.79)	-2.7
(0.95, 3.0975)	-1.95	(1.05, 2.8975)	-2.85
(0.99, 3.0199)	-1.99	(1.01, 2.9799)	-2.91
(0.999, 3.001999)	-1.999	(1.001, 2.997999)	-2.991

c) Which value is being approximated by the secant line when the point Q approaches the point P(1,3)? -2

d) Based on the previous information find the slope of the tangent line passing through (1, 3)

e) Find the equation of the tangent line at the point (1, 3)

$y = mx + b$ $P(1, 3)$

$3 = (2)1 + b = 2 + b = 5 = b$ $y = -2x + 5$

2. The point $(2, 1)$ lies on the curve $f(x) = \frac{1}{x-1}$

a) If Q is the point $(\frac{1}{x-1}, 1)$, find the slope of the secant line PQ (round to six decimals) for the following values of x:

1) 1.5 = -2	2) 1.75 = -1.37	3) 1.9 = -1.1	4) 1.99 = -1.01	5) 1.999 = -1.001
(1.5, 1.5-4)	(1.75, 1.75-4)	(1.9, 1.9-4)	(1.99, 1.99-4)	(1.999, 1.999-4)
(1.5, 2)	(1.75, 1.75)	(1.9, 1.1)	(1.99, 1.01)	(1.999, 1.001)
	$\frac{0.33}{-0.25}$	$\frac{0.11}{-0.1}$	$\frac{0.01}{-0.01}$	$\frac{-0.001}{-0.001}$

Limits Graphically
By: Lucy Solis

20/21

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Find the following limits using the given graph

1) $\lim_{x \rightarrow 1} f(x) = 1$ ✓

2) $\lim_{x \rightarrow 2} f(x) = 4$ ✓

3) $\lim_{x \rightarrow 4} f(x) = -2$ ✓

4) $\lim_{x \rightarrow 2} f(x) = 0$ ✓

5) $\lim_{x \rightarrow 2} f(x) = 9$ ✓

6) $\lim_{x \rightarrow 2} f(x) = 5$ ✓

7) $\lim_{x \rightarrow 2} f(x) = -1$ ✓

8) $\lim_{x \rightarrow 2} f(x) = \infty$ ✓

9) $\lim_{x \rightarrow 2} f(x) = -1$ ✓

10) $\lim_{x \rightarrow 2} f(x) = \infty$ ✓

11) $\lim_{x \rightarrow 2} f(x) = \infty$ ✓

12) $\lim_{x \rightarrow 2} f(x) = \infty$ ✓

13) $\lim_{x \rightarrow \frac{\pi}{2}} f(x) = 0$ ✓

14) $\lim_{x \rightarrow 0} f(x) = 1$ ✓

15) $\lim_{x \rightarrow \frac{\pi}{2}} f(x) = 0$ ✓

Estimating a Limit Numerically
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37/40

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Link: <http://www.rootmath.org/calculus/estimating-limits-numerically>

I. Instructions: Estimate the given limit using a numerical approximation

1. $\lim_{x \rightarrow 2} \frac{x-2}{x^2-4}$

x	1.9	1.99	1.999	2	2.001	2.01	2.1
f(x)	0.25	0.2506	0.2506	0.25	0.2494	0.2494	0.2459

2. Use the table to approximate $\lim_{x \rightarrow 5} \frac{2-\sqrt{x-1}}{5-x}$

x	4.9	4.99	4.999	5.001	5.01	5.1
f(x)	0.2615	0.260	0.25	0.24	0.24	0.24

x approaches 5 from left x approaches 5 from the right

3. Use the table to approximate $\lim_{x \rightarrow -3} \frac{x+3}{2x^2-18}$

x	-3.1	-3.01	-3.001	-3	-2.999	-2.99	-2.9
f(x)	-0.031	-0.0305	-0.0305	undef	-0.0305	-0.0307	-0.0317

4. Use the table to approximate $\lim_{h \rightarrow 0} \frac{(5+h)^2 - 25}{h}$

x	-0.1	-0.01	-0.001	0	0.001	0.01	0.1
f(x)	9.9	9.99	9.999	10	10.001	10.01	10.1

5. $\lim_{x \rightarrow 0} \frac{\sin(x)}{x}$

x	-0.1	-0.01	-0.001	0	0.001	0.01	0.1
f(x)	0.91745	0.91733	0.917453	undef	0.917453	0.917453	0.917453

6. $\lim_{x \rightarrow 0} \frac{\sqrt{x+1}-1}{x}$

x	-0.1	-0.01	-0.001	0	0.001	0.01	0.1
f(x)	0.4142	0.4142	0.414213	undef	0.4142	0.4142	0.4142

Correcciones

a) $\lim_{x \rightarrow 0} 8 = 8$

b) $\lim_{x \rightarrow e} \ln x = 1$

c) $\lim_{x \rightarrow \frac{\pi}{4}} \sec x = 0.707$

d) $\lim_{x \rightarrow -3} \frac{x^2-x-6}{x+3}$
 $(x-3)(x+3) = -7$
 $x \neq -3$

f) $\lim_{x \rightarrow 1} x-2 = -1$

a) graph
 b) Vertical Asymptotes: $x = -1$
 c) limits of $x = 4$