Math 131, Fall 2016
Quiz 1, September 15, 2016
For all 11 a.m. Sections
Show enough work to make it clear how you got your answer.
Do NOT use any methods except those discussed so far in this course.

1. Find $\lim_{t\to 0}\left(\frac{1}{t}-\frac{1}{t^2+t}\right)$

$$= \lim_{t\to 0}\left(\frac{(t+1)}{t(t+1)}-\frac{1}{t(t+1)}\right)$$

$$= \lim_{t\to 0}\frac{t}{t(t+1)} = \lim_{t\to 0}\frac{1}{t+1} = 1$$

2. Find $\lim_{x\to 3}\frac{x-3}{\sqrt{2x+3}-3}$

$$= \lim_{x\to 3}\frac{x-3}{\sqrt{2x+3}-3}\cdot\left(\frac{\sqrt{2x+3}+3}{\sqrt{2x+3}+3}\right)$$

$$= \lim_{x\to 3}\frac{(x-3)\left(\sqrt{2x+3}+3\right)}{(2x+3)-9}$$

$$= \lim_{x\to 3}\frac{(x-3)\left(\sqrt{2x+3}+3\right)}{2(x-3)} = \frac{\sqrt{9}+3}{2}$$

$$= \frac{6}{2} = 3$$

Math 131, Fall 2016
Quiz 1, September 15, 2016
For all 10 a.m. Sections
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1. Find $\lim_{x\to\infty} \frac{3x^5-3x^2+5x-7}{6-5x^2+2x^5}$

divide numerator and denominator by x^5

$$= \lim_{x\to\infty} \frac{3-\frac{3}{x^3}+\frac{5}{x^4}-\frac{7}{x^5}}{6/x^5-5/x^3+2}$$

$$= \frac{3-0+0-0}{0-0+2} = 3/2$$

2. Find the value of c that will make the function $f(x) = \begin{cases} \frac{x^2-3x+2}{x^2+x-6} & \text{if } x \neq 2 \\ c & \text{if } x = 2 \end{cases}$ continuous at 2.

we need c so that $c = f(2) = \lim_{x\to 2} \frac{x^2-3x+2}{x^2+x-6}$

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

$$= \frac{1}{5}$$

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1. f, g, and h are continuous functions for which $f(1) = 2$, $g(1) = 4$. Suppose that

$$\lim_{x\to 1}\left(3f(x) - g(x) + \frac{h(x)}{f(x)}\right) = 9.$$

Find $h(1)$.

By continuity

$$\lim_{x\to 1}\left(3f(x) - g(x) + \frac{h(x)}{f(x)}\right) = 3f(1) - g(1) + \frac{h(1)}{f(1)}$$

$$= 3(2) - 4 + \frac{h(1)}{2} = 9, \text{ so } \frac{h(1)}{2} = 7$$

and $h(1) = 14$

2. Find $\lim_{x\to 2}\frac{3-\sqrt{7x-5}}{x-2}$

$$= \lim_{x\to 2}\frac{\left(3-\sqrt{7x-5}\right)}{(x-2)}\cdot\frac{3+\sqrt{7x-5}}{3+\sqrt{7x-5}}$$

$$= \lim_{x\to 2}\frac{9-(7x-5)}{(x-2)\left(3+\sqrt{7x-5}\right)} = \lim_{x\to 2}\frac{7(2-x)}{(x-2)\left(3+\sqrt{7x-5}\right)}$$

$$= -\lim_{x\to 2}\frac{7}{3+\sqrt{7x-5}} = -\frac{7}{3+\sqrt{9}}$$

$$= \frac{-7}{6}$$

Math 131, Fall 2016
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For all 8 a.m. Sections
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1. Find $\lim_{x\to 3} \frac{x^2-7x+12}{x^2+2x-15}$

$= \lim_{x\to 3} \frac{(x-3)(x-4)}{(x-3)(x+5)} = \frac{3-4}{3+5} = -\frac{1}{8}$

2. If $f(x) = \frac{x^2-x+A}{x-3}$ has a removable discontinuity at 3, what is A?

$\lim_{x\to 3} \frac{x^2-x+A}{x-3} = \infty$ or $-\infty$ unless $\lim_{x\to 3} x^2-x+A = 0$.

To make that happen, we need $9-3+A=0$

so $A = -6$

< Check (not required as part of the solution):

if $A=-6$

$\lim_{x\to 3} \frac{x^2-x-6}{x-3} = \lim_{x\to 3} \frac{(x-3)(x+2)}{(x-3)} = 5$,

so we could "remove" the discontinuity at 3 (where $f(x)$ is not defined originally) by adding the definition $f(3)=5$) >

Math 131, Fall 2016
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For all 12 p.m. Sections
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1. Suppose $f(x) = \begin{cases} x - 2A & \text{when } x \leq 1 \\ 3Ax & \text{when } x > 1 \end{cases}$

Find the value or values of A that will make the function continuous at 1.

We need That

$$\lim_{x \to 1^-} (x - 2A) = f(1) = \lim_{x \to 1^+} 3Ax$$

$$1 - 2A = 3A$$

so

$$1 = 5A$$

$$A = 1/5$$

2. Find $\lim_{t \to 0} \frac{(t-1)\sin t}{2t^2 - 2t}$

$$= \lim_{t \to 0} \frac{(t-1)\sin t}{2t(t-1)} = \frac{1}{2} \lim_{t \to 0} \frac{\sin t}{t}$$

$$= \frac{1}{2}.$$