University of the People

MATH 1211 Calculus 1

Unit 7 Written Assignment

Anonymous Student

1. Calculate the indicated limit.**[ \displaystyle \lim_{x \to 3} \frac{x^2+4x-21}{x^2-7x+12} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cdisplaystyle%20%5Clim_%7Bx%20%5Cto%203%7D%20%5Cfrac%7Bx%5E2%2B4x-21%7D%7Bx%5E2-7x%2B12%7D%20)** .  If a limit does not exist then answer +**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, –**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, or DNE (whichever is correct). Make sure to check that L’Hopital’s rule applies before using it. Also, whenever you apply L’Hopitals rule, indicate that you are using it.

By using the L’Hopital rule,

Assume the limit is at f(x)/g(x) form,

f(3) =9+12-21=0 which is also the limit of f(x) when x->3

g(3) =9-21+12=0 which is also the limit of g(x) when x->3

both the limit =0, this applys the L’Hopital’s rule case 0/0, thus below holds,

2. Calculate the indicated limit. **[ \displaystyle \lim_{x \to 0} \frac{tan3x}{ln(1+x)} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cdisplaystyle%20%5Clim_%7Bx%20%5Cto%200%7D%20%5Cfrac%7Btan3x%7D%7Bln%281%2Bx%29%7D%20)**.  If a limit does not exist then answer +**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, –**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, or DNE (whichever is correct). Make sure to check that L’Hopital’s rule applies before using it. Also, whenever you apply L’Hopitals rule, indicate that you are using it.

By using the L’Hopital rule,

Assume the limit is at f(x)/g(x) form,

f(0) =0 which is also the limit of f(x) when x->0

g(0) =0 which is also the limit of g(x) when x->0

both the limit =0, this applys the L’Hopital’s rule case 0/0, thus below holds,

3. Calculate the indicated limit. **[ \displaystyle \lim_{x \to 0} \frac{sinx-x}{x^2} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cdisplaystyle%20%5Clim_%7Bx%20%5Cto%200%7D%20%5Cfrac%7Bsinx-x%7D%7Bx%5E2%7D%20)**.  If a limit does not exist then answer +**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, –**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, or DNE (whichever is correct). Make sure to check that L’Hopital’s rule applies before using it. Also, whenever you apply L’Hopitals rule, indicate that you are using it.

By using the L’Hopital rule,

Assume the limit is at f(x)/g(x) form,

f(0) =0 which is also the limit of f(x) when x->0

g(0) =0 which is also the limit of g(x) when x->0

both the limit =0, this applys the L’Hopital’s rule case 0/0, thus below holds,

4. Calculate the indicated limit. **[ \displaystyle \lim_{x \to 0} \frac{sin(6x)}{sin(3x)} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cdisplaystyle%20%5Clim_%7Bx%20%5Cto%200%7D%20%5Cfrac%7Bsin%286x%29%7D%7Bsin%283x%29%7D%20)** .  If a limit does not exist then answer +**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, –**[ \infty ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cinfty%20)**, or DNE (whichever is correct). Make sure to check that L’Hopital’s rule applies before using it. Also, whenever you apply L’Hopitals rule, indicate that you are using it.

By using the L’Hopital rule,

Assume the limit is at f(x)/g(x) form,

f(0) =0 which is also the limit of f(x) when x->0

g(0) =0 which is also the limit of g(x) when x->0

both the limit =0, this applys the L’Hopital’s rule case 0/0, thus below holds,

5. Which of the following are indeterminate forms? **[ \frac{0}{0} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cfrac%7B0%7D%7B0%7D%20)**, **[ \frac{0}{ \infty } ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cfrac%7B0%7D%7B%20%5Cinfty%20%7D%20)**, **[ \frac{ \infty }{0} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cfrac%7B%20%5Cinfty%20%7D%7B0%7D%20)**, **[ \frac{ \infty}{\infty} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20%5Cfrac%7B%20%5Cinfty%7D%7B%5Cinfty%7D%20)**  
According to (*4.8 L’Hôpital’s Rule - Calculus Volume 1 | OpenStax*, n.d.), the 0/0 and ∞/∞ are indeterminate forms.

As these forms, the limit we can not determine as both numerator and denominator are difficult to estimate the limits.

0/∞ which is equal 0, ∞/0 is equivalent to ∞ thus they are not indeterminated forms.

6. Use Newton’s Method to determine **[ x_ 1 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20x_%201%20)** and **[ x_ 2 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20x_%202%20)** for the function **[ f(x)=x cos (x)-x^2 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3Dx%20cos%20%28x%29-x%5E2%20)** and the value of **[ x_0=1 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20x_0%3D1%20)**.

By adapting the Newton’s method, f’(x) =cosx-xsinx-2x

X1= X0 – f(x0)/f’(x0) = 0.9985033

X2=X1-f(x1)/f’(x1)≈0.99847785

7. Use Newton’s Method to determine **[ x_1 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20x_1%20)**  and **[ x_2 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20x_2%20)** for the function **[ f(x)=x^3-7x^2+8x-3 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3Dx%5E3-7x%5E2%2B8x-3%20)** and the value of **[ x_0=5 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20x_0%3D5%20)**.

F’(x)=3x2-14x+8

X1= x0-f(x0)/f’(x0) =5-(-13)/13=6

X2=6-f(6)/f’(6)=6-9/32=5.71875

8. Find the antiderivative of the following functions:

a) **[ f(x)=3 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D3%20)**

Thus the antiderivative is 3x+C

b) **[ f(x)=2x ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D2x%20)**

Thus antiderivative is x2+C

c) **[ f(x)=5x^4 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D5x%5E4%20)**

Thus antiderivative is x5+C

9. Find the antiderivative of the following functions:

a) **[ f(x)=sinx ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3Dsinx%20)**

Thus antiderivative is -cosx+C

b) **[ f(x)=sec^2x ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3Dsec%5E2x%20)**

Thus antiderivative is tanx + C

c) **[ f(x)= \sqrt[3]{x} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D%20%5Csqrt%5B3%5D%7Bx%7D%20)**

f(x) = x1/3

thus the antiderivative is ¾\*x4/3+C

10. Find the antiderivative of the following functions:

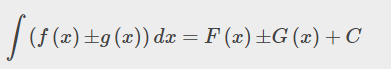
a) **[ f(x)=12-x ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D12-x%20)**

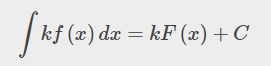
d(12x-1/2x2)/dx = 12-x

thus anti derivative function is

12x-1/2\*x2 +C

b) **[ f(x)=8x^3-9x^2+4 ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D8x%5E3-9x%5E2%2B4%20)**

as sun of antiderivative 



Thus the

c) **[ f(x)= \frac{1}{(3x)^2} ](https://my.uopeople.edu/filter/tex/displaytex.php?texexp=%20f%28x%29%3D%20%5Cfrac%7B1%7D%7B%283x%29%5E2%7D%20)**