**Calculus**

This course is intended for students who will be taking Calculus during the upcoming school year, or who have already taken Calculus and are looking for review and reinforcement. **This course assumes an understanding of all Precalculus and Trigonometry topics**. Please take the Calculus placement test before registering. A score of 70% or higher is recommended to enroll in this course.

**Course Topics**: Limits and Continuity, Differentiation, Applications of Derivatives, Integration, Applications of Integrals, Sequences and Series

**Calculus Placement Test**

Complete the following questions without the use of a calculator.

1. Simplify <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\frac{\left(x^4y^{-3}\right)^2}{x^3y^5}"><mfrac><msup><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><msup><mi>x</mi><mn>4</mn></msup><msup><mi>y</mi><mrow data-mjx-texclass="ORD"><mo>−</mo><mn>3</mn></mrow></msup><mo data-mjx-texclass="CLOSE">)</mo></mrow><mn>2</mn></msup><mrow><msup><mi>x</mi><mn>3</mn></msup><msup><mi>y</mi><mn>5</mn></msup></mrow></mfrac></math>.
2. Find the domain of <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(x\right)=\frac{1}{\sqrt{x+2}}"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo>=</mo><mfrac><mn>1</mn><msqrt><mi>x</mi><mo>+</mo><mn>2</mn></msqrt></mfrac></math>. Write your answer using interval notation.
3. Simplify <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\frac{x^2+4x+3}{x^2+2x-3}"><mfrac><mrow><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><mn>4</mn><mi>x</mi><mo>+</mo><mn>3</mn></mrow><mrow><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><mn>2</mn><mi>x</mi><mo>−</mo><mn>3</mn></mrow></mfrac></math>.
4. Given <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(x\right)=x^2+2x+3"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo>=</mo><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><mn>2</mn><mi>x</mi><mo>+</mo><mn>3</mn></math>, find and simplify <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(a+1\right)"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>a</mi><mo>+</mo><mn>1</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow></math>.
5. Solve <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x(4x+12)=-9"><mi>x</mi><mo stretchy="false">(</mo><mn>4</mn><mi>x</mi><mo>+</mo><mn>12</mn><mo stretchy="false">)</mo><mo>=</mo><mo>−</mo><mn>9</mn></math>.  
   **For questions 6-8, <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(x\right)=x^2-x+1"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo>=</mo><msup><mi>x</mi><mn>2</mn></msup><mo>−</mo><mi>x</mi><mo>+</mo><mn>1</mn></math> and<math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="g\left(x\right)=2x-1"><mi>g</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo>=</mo><mn>2</mn><mi>x</mi><mo>−</mo><mn>1</mn></math>.**
6. Find and simplify <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(x+1\right)"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo>+</mo><mn>1</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow></math>.
7. Find and simplify <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(g\left(x\right)\right)"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>g</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo data-mjx-texclass="CLOSE">)</mo></mrow></math>.
8. Find and simplify <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(f\left(2\right)\right)"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mn>2</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo data-mjx-texclass="CLOSE">)</mo></mrow></math>
9. Given that <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\cos x=-\frac{1}{4}"><mi>cos</mi><mo data-mjx-texclass="NONE">⁡</mo><mi>x</mi><mo>=</mo><mo>−</mo><mfrac><mn>1</mn><mn>4</mn></mfrac></math> and <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\pi\le x\le2\pi"><mi>π</mi><mo>≤</mo><mi>x</mi><mo>≤</mo><mn>2</mn><mi>π</mi></math>, what is the value of <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\sin x"><mi>sin</mi><mo data-mjx-texclass="NONE">⁡</mo><mi>x</mi></math>?
10. Solve <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\log_327=x+4"><msub><mi>log</mi><mn>3</mn></msub><mo data-mjx-texclass="NONE">⁡</mo><mn>27</mn><mo>=</mo><mi>x</mi><mo>+</mo><mn>4</mn></math>.
11. If the number of cells in a culture doubles every hour, how many cells will be in the culture after a full day if at the beginning of the day there is a single cell in the culture?
12. Find the center and radius of the circle with equation <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x^2+y^2-4x+12y+30=0"><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><msup><mi>y</mi><mn>2</mn></msup><mo>−</mo><mn>4</mn><mi>x</mi><mo>+</mo><mn>12</mn><mi>y</mi><mo>+</mo><mn>30</mn><mo>=</mo><mn>0</mn></math>
13. Evaluate <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="2\log_24+\frac{1}{2}\log_25-\frac{1}{2}\log_220"><mn>2</mn><msub><mi>log</mi><mn>2</mn></msub><mo data-mjx-texclass="NONE">⁡</mo><mn>4</mn><mo>+</mo><mfrac><mn>1</mn><mn>2</mn></mfrac><msub><mi>log</mi><mn>2</mn></msub><mo data-mjx-texclass="NONE">⁡</mo><mn>5</mn><mo>−</mo><mfrac><mn>1</mn><mn>2</mn></mfrac><msub><mi>log</mi><mn>2</mn></msub><mo data-mjx-texclass="NONE">⁡</mo><mn>20</mn></math>
14. Solve <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="81^x\cdot3^{x+1}=\frac{1}{9}"><msup><mn>81</mn><mi>x</mi></msup><mo>⋅</mo><msup><mn>3</mn><mrow data-mjx-texclass="ORD"><mi>x</mi><mo>+</mo><mn>1</mn></mrow></msup><mo>=</mo><mfrac><mn>1</mn><mn>9</mn></mfrac></math>.
15. Find <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\sin\left(\frac{7\pi}{6}\right)"><mi>sin</mi><mo data-mjx-texclass="NONE">⁡</mo><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mfrac><mrow><mn>7</mn><mi>π</mi></mrow><mn>6</mn></mfrac><mo data-mjx-texclass="CLOSE">)</mo></mrow></math>.
16. Solve <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="-2\cos^2x+2\sin^2x=2\cos x"><mo>−</mo><mn>2</mn><msup><mi>cos</mi><mn>2</mn></msup><mo data-mjx-texclass="NONE">⁡</mo><mi>x</mi><mo>+</mo><mn>2</mn><msup><mi>sin</mi><mn>2</mn></msup><mo data-mjx-texclass="NONE">⁡</mo><mi>x</mi><mo>=</mo><mn>2</mn><mi>cos</mi><mo data-mjx-texclass="NONE">⁡</mo><mi>x</mi></math> on the interval <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\left[0,2\pi\right]"><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">[</mo><mn>0</mn><mo>,</mo><mn>2</mn><mi>π</mi><mo data-mjx-texclass="CLOSE">]</mo></mrow></math>.
17. What is the remainder when <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x^3+19x^2+114x+218"><msup><mi>x</mi><mn>3</mn></msup><mo>+</mo><mn>19</mn><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><mn>114</mn><mi>x</mi><mo>+</mo><mn>218</mn></math> is divided by <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\left(x+4\right)"><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo>+</mo><mn>4</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow></math>?
18. Find the inverse function of <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(x\right)=\left(x-6\right)^3+6"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo>=</mo><msup><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo>−</mo><mn>6</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow><mn>3</mn></msup><mo>+</mo><mn>6</mn></math>.
19. Find the product of <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\left(-3+2i\right)\left(-3-7i\right)"><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mo>−</mo><mn>3</mn><mo>+</mo><mn>2</mn><mi>i</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mo>−</mo><mn>3</mn><mo>−</mo><mn>7</mn><mi>i</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow></math> and write your answer in standard form.
20. Identify the vertical asymptotes of <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f\left(x\right)=\frac{\left(x^2+19\right)\left(x-4\right)}{x^2-81}"><mi>f</mi><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow><mo>=</mo><mfrac><mrow><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><mn>19</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mi>x</mi><mo>−</mo><mn>4</mn><mo data-mjx-texclass="CLOSE">)</mo></mrow></mrow><mrow><msup><mi>x</mi><mn>2</mn></msup><mo>−</mo><mn>81</mn></mrow></mfrac></math>.

Answer Key

1. <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\frac{x^5}{y^{11}}"><mfrac><msup><mi>x</mi><mn>5</mn></msup><msup><mi>y</mi><mrow data-mjx-texclass="ORD"><mn>11</mn></mrow></msup></mfrac></math> 2.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\left(-2,\infty\right)"><mrow data-mjx-texclass="INNER"><mo data-mjx-texclass="OPEN">(</mo><mo>−</mo><mn>2</mn><mo>,</mo><mi mathvariant="normal">∞</mi><mo data-mjx-texclass="CLOSE">)</mo></mrow></math> 3.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\frac{x+1}{x-1}"><mfrac><mrow><mi>x</mi><mo>+</mo><mn>1</mn></mrow><mrow><mi>x</mi><mo>−</mo><mn>1</mn></mrow></mfrac></math> 4.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="a^2+2"><msup><mi>a</mi><mn>2</mn></msup><mo>+</mo><mn>2</mn></math> 5.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x=-\frac{3}{2}"><mi>x</mi><mo>=</mo><mo>−</mo><mfrac><mn>3</mn><mn>2</mn></mfrac></math> 6.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x^2+x+1"><msup><mi>x</mi><mn>2</mn></msup><mo>+</mo><mi>x</mi><mo>+</mo><mn>1</mn></math> 7.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="4x^2-6x+3"><mn>4</mn><msup><mi>x</mi><mn>2</mn></msup><mo>−</mo><mn>6</mn><mi>x</mi><mo>+</mo><mn>3</mn></math> 8.) 7 9.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="-\frac{\sqrt{15}}{4}"><mo>−</mo><mfrac><msqrt><mn>15</mn></msqrt><mn>4</mn></mfrac></math> 10.) -1 11.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="2^{24}"><msup><mn>2</mn><mrow data-mjx-texclass="ORD"><mn>24</mn></mrow></msup></math> 12.) center: (2,-6) radius: <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="\sqrt{10}"><msqrt><mn>10</mn></msqrt></math> 13.) 3 14.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x=-\frac{3}{5}"><mi>x</mi><mo>=</mo><mo>−</mo><mfrac><mn>3</mn><mn>5</mn></mfrac></math> 15.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="-\frac{1}{2}"><mo>−</mo><mfrac><mn>1</mn><mn>2</mn></mfrac></math> 16.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x=\frac{\pi}{3},\pi,\frac{5\pi}{3}"><mi>x</mi><mo>=</mo><mfrac><mi>π</mi><mn>3</mn></mfrac><mo>,</mo><mi>π</mi><mo>,</mo><mfrac><mrow><mn>5</mn><mi>π</mi></mrow><mn>3</mn></mfrac></math> 17.) 2 18.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="f^{-1}=\sqrt[3]{x-6}+6"><msup><mi>f</mi><mrow data-mjx-texclass="ORD"><mo>−</mo><mn>1</mn></mrow></msup><mo>=</mo><mroot><mrow><mi>x</mi><mo>−</mo><mn>6</mn></mrow><mn>3</mn></mroot><mo>+</mo><mn>6</mn></math> 19.) 23+15i 20.) <math xmlns="http://www.w3.org/1998/Math/MathML" display="block" data-is-equatio="1" data-latex="x=9\ \text{and }x=-9"><mi>x</mi><mo>=</mo><mn>9</mn><mtext></mtext><mtext>and </mtext><mi>x</mi><mo>=</mo><mo>−</mo><mn>9</mn></math>

Scoring Guidelines

70% or higher (14 or more correct): Calculus recommended

Under 70% (0-13 correct): Precalculus/Trigonometry recommended