### Course Description

<table>
<thead>
<tr>
<th>COURSE NAME</th>
<th>MATH 72 – INTERMEDIATE ALGEBRA I &amp; II (STEM/BUS)</th>
</tr>
</thead>
</table>
| Number of Units and Grading Options | 6 units  
Pass/No Pass or Grade is Allowed |
| Catalog Description | Delivers Intermediate Algebra for STEM and Business Majors. Investigates rational expressions and equations, systems of equations in two and three variables, absolute value equations and inequalities, radical expressions and equations, rational exponents, complex numbers, quadratic equations, graphs of linear and radical functions, parabolas, and circles. Requires graphing calculator. (Not open to students with credit in MATH 62, MATH 70, or equivalent.) |
| Degree Applicability | Satisfies Associate Degree requirements  
Non-transferable |
| Co-requisite Support Available? | YES Math 81 – Support for Int. Algebra I & II; 2 additional units (Pass/No Pass only) |
| Additional Information | Int. Algebra I & II is a course that prepares students for a major in BSTEM (Business, Science, Technology, Engineering, and Math) fields and who intend to transfer to a 4-year institution. |

**Helpful Background Knowledge:**

Students should have a strong Elementary Algebra background. If it has been several years since your last Algebra course, you may need to utilize college resources to learn/recall Elementary Algebra concepts necessary to understand the core content of this course.

**Topics that are typically covered in Intermediate Algebra I & II are:**

1. **Writing equations of lines.** Write the equation of the line that passes through the point \((0, -1)\) with slope \(m = \frac{2}{3}\). Use function notation where possible.

   \[
   (x_1, y_1) = (0, -1), \quad m = \frac{2}{3} \\
   \gamma - \gamma_1 = m (x - x_1) \\
   \gamma - (-1) = \frac{2}{3} (x - 0) \\
   \gamma + 1 = \frac{2}{3} x \\
   \gamma + 1 = \frac{2}{3} x - 1 \\
   \gamma = \frac{2}{3} x - 1 \\
   \gamma(\alpha) = \frac{2}{3} \alpha - 1
   \]
2. **Graphing and evaluating piece-wise functions.** Graph and find \( f(-3) \):

\[
f(x) = \begin{cases} 
  -4 & x < -2 \\
  -x^2 & x \geq -2 
\end{cases}
\]

Find \( f(-3) \):

Since \(-3 < -2\)

Use \( f(x) = -4 \)

\( f(-3) = \boxed{-4} \)

3. **Solving word problems.** How much money will be in your account if you invest $3000 at an annual interest rate of 4\% for 10 years compounded:

   a. Quarterly

   \[
   A = P \left(1 + \frac{r}{n}\right)^{nt}
   \]

   \[
   \begin{align*}
   P &= \$3000 \\
   r &= 4\% = 0.04 \\
   t &= 10 \text{ years} \\
   n &= 4
   \end{align*}
   \]

   \[
   A = 3000 \left(1 + \frac{0.04}{4}\right)^{4(10)}
   \]

   \[
   A = 3000 \left(1 + 0.01\right)^{40}
   \]

   \[
   A = 3000 \times 1.01^{40}
   \]

   \[
   A \approx \boxed{\$4,466.59}
   \]

   b. Continuously

   \[
   A = Pe^{rt}
   \]

   \[
   \begin{align*}
   P &= \$3000 \\
   r &= 4\% = 0.04 \\
   t &= 10 \text{ years} \\
   n &= 4
   \end{align*}
   \]

   \[
   A = 3000e^{0.04 \times 10}
   \]

   \[
   A = 3000e^{0.4} \approx \boxed{\$4,475.47}
   \]
4. **Finding the domain of functions.** Find the domain of \( f(x) = \frac{x - 6}{x^2 - x - 12} \) \( \text{Write your answer using interval notation.} \)

\[
\begin{align*}
x^2 - x - 12 &= 0 \\
(x - 4)(x + 3) &= 0 \\
x - 4 &= 0, \quad x + 3 = 0 \\
x &= 4, \quad x = -3
\end{align*}
\]

\((-\infty, -3) \cup (-3, 4) \cup (4, \infty)\)

5. **Finding the composition of functions.** For \( f(x) = \sqrt{x} \) and \( g(x) = \frac{x^2 + 16}{x - 2} \), find \( (f \circ g)(x) \):

\[
(f \circ g)(x) = f(g(x)) = \sqrt{\frac{x^2 + 16}{x - 2}}
\]

6. **Working with inverse function.** Find the inverse of the one-to-one function: \( f(x) = 64x^3 - 1 \)

\[
\begin{align*}
f(x) &= 64x^3 - 1 \\
y &= 64x^3 - 1 \\
x &= 64y^3 - 1 \\
x + 1 &= 64y^3 - 1 + 1
\end{align*}
\]

\[
\begin{align*}
x + 1 &= 64y^3 \\
\frac{x + 1}{64} &= y^3 \\
\sqrt[3]{y^3} &= \frac{\sqrt[3]{x + 1}}{64} \\
y &= \frac{\sqrt[3]{x + 1}}{4} \\
f^{-1}(x) &= \frac{\sqrt[3]{x + 1}}{4}
\end{align*}
\]

7. **Solving exponential equations.** Solve: \( 3^x = \frac{1}{243} \)

\[
\begin{align*}
3^x &= \frac{1}{3^5} \\
3^x &= 3^{-5} \\
x &= -5
\end{align*}
\]
8. **Solving logarithmic equations.** Solve: \( \ln(x + 2) + \ln(x - 2) = \ln 5 \)

\[
\begin{align*}
\ln(x+2) + \ln(x-2) &= \ln 5 \\
\ln((x+2)(x-2)) &= \ln 5 \\
\ln(x^2 - 4) &= \ln 5 \\
e^{\ln(x^2 - 4)} &= e^{\ln 5} \\
x^2 - 4 &= 5 \\
x^2 - 4 + 4 &= 5 + 4 \\
x^2 &= 9 \\
\pm \sqrt{x^2} &= \pm \sqrt{9} \\
x &= \pm 3 \\
\boxed{x = 3}
\end{align*}
\]

*Check:* \( x = 3 \)

\[
\begin{align*}
\ln(x+3) + \ln(3-2) &= \ln 5 \\
\ln(5) + \ln(1) &= \ln 5 \\
\ln 5 + 0 &= \ln 5 \\
\ln 5 &= \ln 5 \checkmark \\
x &= -3 \\
\ln(-3+2) + \ln(-3-2) &= \ln 5 \\
\ln(-1) + \ln(-5) &= \ln 5 \\
\text{undefined} \\
x = -3 \text{ extraneous solution}
\end{align*}
\]

9. **Working with conic sections.** Identify whether each equation, when graphed, will be a parabola, circle, ellipse, or hyperbola.

a. \( x^2 + 4y^2 = 16 \)

\[
\frac{x^2}{16} + \frac{4y^2}{16} = 1
\]

**Ellipse**

b. \( 9y^2 - 4x^2 = 36 \)

\[
\begin{align*}
9y^2 &\quad 4x^2 = 36 \\
\text{minus} \\
\boxed{\text{Hyperbola}}
\end{align*}
\]