Faculty of Sciences

Department of Mathematics

Mathematics Placement Test for:

Faculty of Business Administration, Faculty of Mass Communication & Fine Arts, and Faculty of Religion & Humanities.

Instructions

The Mathematics Placement Test is required for all applicants applying for Faculty of Business Administration, Faculty of Mass Communication & Fine Arts, and Faculty of Religion & Humanities. The test consists of 30 MCQ exercises that must be solved within 60 minutes. The passing grade is 15/30. The exercises target the following topics:

1. **Basic Algebra**
   - Sets of Numbers and Notation of Intervals.
   - Notation of Absolute Value.
   - Algebraic expressions: Addition, subtraction, multiplication and simplification.
2. **Solving Linear Equations and inequalities**
   - Solving Linear Equations.
   - Solving Linear Inequalities.
   - Solving Equations and Inequalities with absolute Values.
3. **Graphing of Straight lines and Functions**
   - Plotting Points on orthonormal System.
   - Finding equation of a straight line, starting from two points or having the slope with one point.
   - Parallel and Perpendicular straight lines.
   - Graphing an equation of two variables using some point and deducing if this graph corresponds to a function or no.
4. **Solving a system of linear equations with two variables**
   - Graphically.
   - Substitution Method.
   - Elimination Method.
5. **Polynomials and polynomial functions**
   - Addition, Subtraction and Multiplication.
   - Factorization.
   - Remarkable Identities.
   - Solving polynomial equations.
6. **Rational functions and expressions**

- Domain of Definition.
- Addition, subtraction, multiplication and division.
- Solving Rational Equations.
- Long division of polynomials.

7. **Irrational Functions and Expressions**

- Notation of Radical.
- Domain of definition.
- Solving Radical equations.
- Rationalizing the denominator.

8. **Quadratic Equations**

- The discriminant and the solution.
- Sign of a quadratic equation.
- Completing square.

Remark: All types of calculators are not allowed.

Sample Placement Test

Exercise 1:

The number $1+\sqrt{2}$ belongs to

1. $\mathbb{Q}$.
2. $\mathbb{Z}$.
3. $\mathbb{N}$.
4. $\mathbb{R}$. ✓
5. None of the above.

Exercise 2:

$|-2+3|\times 2-|-4+1|\times 3+|5|-|-6|$ is equal to

1. -8. ✓
2. 22.
3. 10.
4. -10.
5. None of the above.

Exercise 3:

$16-[4-(-2)]+18\div 2+3$ is equal to

1. 13.
2. 22. ✓

3. 17.

4. 26.

5. None of the above.

Exercise 4:

The expression $\left(\frac{8x^2y^{-2}}{3x^8y^7}\right)^3$ is equal to

1. $\left(\frac{8}{3}\right)^3 x^{18}y^{-27}$.
2. $\left(\frac{8}{3}\right)^3 x^{-18}y^{-27}$. ✓
3. $\left(\frac{8}{3}\right)^3 x^{-18}y^{27}$.
4. $\left(\frac{8}{3}\right)^3 x^{18}y^{27}$.
5. None of the above.

Exercise 5:

The expression $(9x^4y^2)(-4x^{-2}y^2)$ is equal

1. $-36x^2y^{-4}$.
2. $-36x^{-8}y^4$.
3. $-36x^2y^4$. ✓
4. $-36x^{-2}y^{-4}$.
5. None of the above.

Exercise 6:

The solution set S of the linear equation $2x+1=5$ is given by

1. $S=\{-3\}$.
2. $S=\{-2\}$.
3. $S=\{2\}$. ✓
4. $S=\{3\}$.
5. None of the above.

Exercise 7:

The solution set S of the linear equation $\frac{2x-1}{3}+\frac{1}{4}=\frac{1-x}{3}$ is given by

1. $S=\{\frac{5}{4}\}$.
2. $S=\{\frac{4}{5}\}$.
3. $S=\{\frac{12}{5}\}$.
4. $S=\{\frac{5}{12}\}$. ✓
5. None of the above.

Exercise 8:

The solution set S of the inequality $2(3x+5)-3<5(x+1)+11(x+2)$ is given by

1. $S=]-2,+\infty[$. ✓
2. $S=]-\infty,2[$.

3. $S =]2, +\infty[$.

4. $S =]-\infty, -2[$.

5. None of the above.

Exercise 9:

The solution set S of the inequality $3|2x+1|+16 \leq 25$ is given by

1. $S =]-2, 1[$.

2. $S = [-2, 1[$.

3. $S = [-2, 1]$. ✓

4. $S =]-2, 1]$.

5. None of the above.

Exercise 10:

The solution set S of the inequality $3|-4x+10| > 6$ is given by

1. $S =]-\infty, 3[$.

2. $S =]2, \infty[$.

3. $S =]-\infty, 2[\cup]2, 3[\cup]3, +\infty[$.

4. $S =]-\infty, 2[\cup]3, +\infty[$. ✓

5. None of the above.

Exercise 11:

The solution set S of the equation $|2x+1|=7$ is given by

1. $S=\{-4,3\}$. ✓
2. $S=\{-4\}$.
3. $S=\{3\}$.
4. The equation has no solution.
5. None of the above.

Exercise 12:

The solution set S of the equation $|3x+6|=|2-x|$ is given by

1. $S=\{-4\}$.
2. $S=\{-4,-1\}$. ✓
3. $S=\{-1\}$.
4. The equation has no solution.
5. None of the above.

Exercise 13:

The slope of the line passing through the points $A(2,-3)$ and $B(4,-2)$ is equal to

1. $-\frac{5}{6}$.
2. $\frac{5}{6}$.

3. $\frac{5}{2}$.

4. $\frac{1}{2}$. ✓

5. None of the above.

Exercise 14:

Let $m \in \mathbb{R}$. We consider the line (l_1) given by $y = (m+2)x - 3$ and the line (l_2) given by $y = 3x + 4$. Then, the lines (l_1) and (l_2) are parallel if

1. $m = 2$.

2. $m = -5$.

3. $m = 1$. ✓

4. m does not exist.

5. None of the above.

Exercise 15:

Let $m \in \mathbb{R}$. We consider the line (l_1) given by $y = (2m-5)x + 6$ and the line (l_2) given by $y = 2x - 4$. Then, the lines (l_1) and (l_2) are perpendicular if

1. $m = \frac{9}{4}$. ✓

2. $m = -\frac{9}{4}$.

3. $m = \frac{9}{2}$.

4. $m = -\frac{9}{2}$.

5. None of the above.

Exercise 16:

Let $a \in \mathbb{R}$ and let f be the function given by $f(x) = x^2 - 1$. The point $A(1, a)$ belongs to the curve of the function f if

1. $a = \sqrt{2}$.
2. $a = -\sqrt{2}$.
3. a does not exist.
4. $a = 0$. ✓
5. None of the above.

Exercise 17:

The system

$$\begin{cases} 2x + y &= 7, \\ x - 2y &= 6 \end{cases}$$

has

1. One solution. ✓
2. The system has no solution.
3. Two solutions.
4. Infinite number of solutions.
5. None of the above.

Exercise 18:

If $p(x) = 2x^3 + 3x + 4$, $q(x) = 3x^2 - 2x + 1$, and $r(x) = 2x^2 - x + 1$, then $2p(x) - q(x) \times r(x)$ is equal to

1. $-6x^4+11x^3-7x^2+9x+5$.

2. $-6x^4+11x^3-7x^2+10x+7$.

3. $-6x^4+11x^3-6x^2+9x+7$.

4. $-6x^4+11x^3-7x^2+9x+7$. ✓

5. None of the above.

Exercise 19:

By factoring $x^3+3x^2-4x-12$ we get

1. $x^3+3x^2-4x-12=(x+3)(x+2)^2$.

2. $x^3+3x^2-4x-12=(x+3)(x+2)(x-2)$. ✓

3. $x^3+3x^2-4x-12=(x+3)(x-2)^2$.

4. $x^3+3x^2-4x-12=(x-3)(x+2)(x-2)$.

5. None of the above.

Exercise 20:

The solution set S of the equation $x^3+3x^2-4x-12=0$ is given by

1. $S=\{-3,-2\}$.

2. $S=\{-3,-2,2\}$. ✓

3. $S=\{-3,2\}$.

4. The equation has no solution.

5. None of the above.

Exercise 21:

The domain of definition of the function $f(x) = \dfrac{1}{x-2}$ is given by

1. $D =]-\infty, +\infty[$.
2. $D =]-\infty, 2[\cup]2, +\infty[$. ✓
3. $D =]-\infty, -2[\cup]-2, +\infty[$.
4. $D =]2, +\infty[$.
5. None of the above.

Exercise 22:

If $p(x) = \dfrac{2x+1}{x+1}$ and $q(x) = \dfrac{x-5}{3x+7}$, then $p(x) \times q(x)$ is equal to

1. None of the below.
2. $p(x) \times q(x) = \frac{-2x^2+9x-5}{3x^2+10x-7}$.
3. $p(x) \times q(x) = \frac{2x^2-9x+5}{3x^2+10x+7}$.
4. $p(x) \times q(x) = p(x) \times q(x) = \frac{2x^2+9x+5}{3x^2+10x+7}$.
5. $p(x) \times q(x) = \frac{2x^2-9x-5}{3x^2+10x+7}$. ✓

Exercise 23:

The set of solution S of the equation

$$\frac{2}{x+2} + \frac{4}{x-2} = \frac{x-1}{x^2-4}$$

is given by

1. $S = \{-1\}$. ✓
2. $S = \{2\}$.
3. $S = \{-2\}$.
4. $S = \{-2, -1, 2\}$.
5. None of the above.

Exercise 24:

Using the Long or Euclidean division, $x^2 - 9 \div x - 2$ is equal to

1. $x + 2 - \dfrac{5}{x-2}$. ✓
2. $x - 2 + \dfrac{5}{x-2}$.
3. $-x - 2 - \dfrac{5}{x-2}$.
4. $x + 2 + \dfrac{5}{x-2}$.
5. None of the above.

Exercise 25:

The domain of definition D of the function $f(x) = \sqrt{2x+7} + x$ is given by

1. $D = [-\frac{7}{2}, +\infty[$. ✓
2. $D = \mathbb{R}$.
3. $D =]-\frac{7}{2}, +\infty[$.
4. $D = \mathbb{R} - \{-\frac{7}{2}\}$.

5. None of the above.

Exercise 26:

By simplifying, $4\sqrt[3]{3}-\sqrt{5}+2\sqrt[3]{3}+4\sqrt{5}$ is equal to

1. $6\sqrt[3]{3}+3\sqrt{5}$. ✓
2. $6\sqrt[3]{3}-3\sqrt{5}$.
3. $-6\sqrt[3]{3}-3\sqrt{5}$.
4. $-6\sqrt[3]{3}+3\sqrt{5}$.
5. None of the above.

Exercise 27:

The set of solution S of the equation $\sqrt{2x+7}=x+2$ is given by

1. $S=\{1\}$. ✓
2. $S=\{-3\}$.
3. $S=\{-3,1\}$.
4. The equation has no solution.
5. None of the above.

Exercise 28:

By rationalizing the function $f(x)=\dfrac{x+1}{\sqrt{x}-2}$ we obtain

1. $f(x)=\frac{(x+1)(\sqrt{x}+2)}{x-4}$. ✓

2. $f(x) = \frac{(x+1)(\sqrt{x}+2)}{x+4}$.

3. $f(x) = \frac{(x-1)(\sqrt{x}+2)}{x-4}$.

4. $f(x) = -\frac{(x+1)(\sqrt{x}+2)}{x-4}$.

5. None of the above.

Exercise 29:

The set of the real roots S of the polynomial $2x^2+5x-3$ is given by

1. $S = \{-3, \frac{1}{2}\}$. ✓

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

3. $S = \{-3\}$.

4. The polynomial doesn't have real solutions.

5. None of the above.

Exercise 30:

Using the table of sign, the function $f(x) = x(x-1)$ is strictly negative if

1. $x \in]0,1[$. ✓

2. $x \in]1,+\infty[$.

3. $x \in]-\infty,1[$.

4. It is always positive on $\mathbb{R}$.

5. None of the above.