College Algebra Placement Test
January 23, 2013

Last Name, First Name
Identification Number

- Calculators, books and notes are not allowed.
- The processing time for the test is 120 minutes.
- Circle the best answer.
- Do not write in the boxes.
- Do not write in pencil.

<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part B: Equations and Inequalities</td>
<td>60%=15 p.</td>
<td></td>
</tr>
<tr>
<td>Part C: Functions and Their Graphs</td>
<td>60%=15 p.</td>
<td></td>
</tr>
<tr>
<td>Part D: Word Problems</td>
<td>50%=10 p.</td>
<td></td>
</tr>
<tr>
<td>Total Points</td>
<td>60%=60 p.</td>
<td></td>
</tr>
</tbody>
</table>
Part A: Basic Arithmetics

1. \( 2(3 - 4) - 4(1 + 3) \) is equal to:
   \( \begin{align*}
   & (a) 16 \quad (b) -18 \quad (c) 18 \quad (d) 10 \\
   & \end{align*} \)  

2. \( (x - 2)^2 - 2x^2 - 4 \) is equal to:
   \( \begin{align*}
   & (a) -x^2 + 2 \quad (b) x(x + 4) \quad (c) -x(x - 4) \quad (d) -x(x + 4) \\
   & \end{align*} \)  

3. \( \frac{1}{2} - \frac{1}{3} + \frac{1}{4} \) equals:
   \( \begin{align*}
   & (a) \frac{5}{12} \quad (b) \frac{1}{4} \quad (c) \frac{3}{12} \quad (d) -\frac{1}{12} \\
   & \end{align*} \)  

4. \( \frac{x - y}{x+y} + \frac{x-y}{x+y} \) is equal to:
   \( \begin{align*}
   & (a) \frac{-y}{x^2+y^2} \quad (b) \frac{x^2+y^2}{x^2-y^2} \quad (c) \frac{x}{x+y} \quad (d) \frac{2x^2-xy+y^2}{x^2-y^2} \\
   & \end{align*} \)  

5. \( \frac{2}{3} \div \frac{10}{12} \) is equal to:
   \( \begin{align*}
   & (a) \frac{5}{9} \quad (b) \frac{20}{36} \quad (c) \frac{4}{5} \quad (d) \frac{5}{4} \\
   & \end{align*} \)  

6. \( \frac{4x-8}{x-2} \cdot \frac{x+2}{2x-4} \) is equal to:
   \( \begin{align*}
   & (a) \frac{2x+4}{x-2} \quad (b) \frac{2x-4}{x-2} \quad (c) \frac{4}{x-2} \quad (d) \frac{1}{x-2} \\
   & \end{align*} \)  

7. \( 2^3 \cdot 16 \cdot 2^{-6} \) equals:
   \( \begin{align*}
   & (a) 16 \cdot 10^{-18} \quad (b) 89746 \quad (c) 2 \quad (d) 16 \\
   & \end{align*} \)  

8. \( (x^{-2} y^{\frac{1}{3}} z^{-1})^3 \) is equal to:
   \( \begin{align*}
   & (a) \frac{\sqrt[3]{y}}{x^2 z^3} \quad (b) x y^{\frac{19}{6}} z^2 \quad (c) \frac{(\sqrt[3]{y})^3}{x^3 \sqrt[3]{z}} \quad (d) 3x^{-2} + 3y^{\frac{1}{6}} + 3z^{-1} \\
   & \end{align*} \)  

9. \( \sqrt{a^2 b^4 c^6} \) is equal to:
   \( \begin{align*}
   & (a) \frac{1}{a^2 b^4 c^6} \quad (b) ab^2 c^3 \quad (c) ab^2 c^4 \quad (d) \frac{1}{ab^2 c^3} \\
   & \end{align*} \)  

10. \( \frac{x^2 y^{1-4}}{x^5 y^{-2}} \) is equal to:
    \( \begin{align*}
    & (a) \frac{x^{-5}}{y^{2x-6}} \quad (b) \frac{x^{-1}}{y^{x-2}} \quad (c) \frac{x^5}{y^{2x}} \\
    & \end{align*} \)  

11. \( 5\sqrt{12} + 2\sqrt{3} - 3\sqrt{48} \) is equal to:
    \( \begin{align*}
    & (a) 2.4 \quad (b) 0 \quad (c) 4\sqrt{3} \quad (d) 24\sqrt{3} \\
    & \end{align*} \)
12. \( \frac{\sqrt{16a^{2}b^{4}}}{\sqrt{ab^{3}}} \) equals:
(a) \( 4\sqrt{ab} \)  (b) \( ab \)  (c) \( \sqrt{a} - b \)  (d) \( 4\sqrt{a}b \)

13. \( 27^{-\frac{3}{4}} \) is equal to:
(a) \( \frac{1}{81} \)  (b) \( 0.3 \)  (c) \( 1261 \)  (d) \(-81 \)

14. \(|12 - 15| - |3 - 7| \) equals:
(a) \( 7 \)  (b) \( 1 \)  (c) \(-1 \)  (d) \(-7 \)

15. \(| - 5^{3} + 7^{2} | - 4(-2) \) is equal to:
(a) \(-68 \)  (b) \( 84 \)  (c) \(-84 \)  (d) \( 68 \)

16. If \( x = yz \) then
(a) \( \sqrt{x} = \sqrt{y} + \sqrt{z} \)  (b) \( \frac{x^{2}}{y} = \frac{yz}{y} \)  (c) \( \frac{x^{2}}{y} = \frac{xz}{y^{2}} \)  (d) \( \frac{x}{y} = \frac{xyz}{y^{2}} \)

17. If \( a \leq -b \) then
(a) \(-a \leq b \)  (b) \(-2(a + b) \geq 0 \)  (c) \(2(a + b) \geq 0 \)  (d) \(2(a - b) \geq 0 \)

18. Which of the statements is true?
(a) \(-2 \leq -5 \)  (b) \(-5 < -5 \)  (c) \(-5 < -2 \)  (d) \(-5 > -2 \)

19. Which of the statements is true for \( x \neq 0 \)?
(a) \(|-x| = -|x| \)  (b) \(|-x| > -|x| \)  (c) \(|-x| < -|x| \)  (d) \(|-x| \leq -|x| \)

20. \( \frac{4 \cdot 10^{5}}{5 \cdot 10^{6}} \) equals:
(a) \( 0.8 \)  (b) \( 0.08 \)  (c) \( 8 \)  (d) \( 20 \cdot 10^{11} \)
1. The solution of $2x + 3 = 5$ is:
   (a) $x = 4$  
   (b) $x = 16$  
   (c) $x = 1$  
   (d) no solution!
   
2. If $\frac{2}{3}x + 5 = -\frac{1}{4}x$, then:
   (a) $x = -\frac{60}{11}$  
   (b) $x = \frac{60}{11}$  
   (c) $x = 0.4$  
   (d) $x = \frac{11}{60}$
   
3. If $|x - 1| = 5$, then:
   (a) $x = -4$  
   (b) $x = 6$  
   (c) $x_1 = 4, x_2 = -6$  
   (d) $x_1 = -4, x_2 = 6$
   
4. If $-3x + 2 \leq 4$, then:
   (a) $x > -\frac{2}{3}$  
   (b) $x \geq -\frac{2}{3}$  
   (c) $-\frac{2}{3} \leq x \leq \frac{2}{3}$  
   (d) $x \leq -\frac{2}{3}$
   
5. Give all $x \in \mathbb{R}$ satisfying $\frac{1}{x-2} > 3, x \neq 2$:
   (a) $2 < x < \frac{7}{3}$  
   (b) $x \leq \frac{7}{3}$  
   (c) $x < \frac{7}{3}$  
   (d) $-\frac{7}{3} \leq x \leq \frac{7}{3}$
   
6. Solve the equation $x^2 - 4 = 5$:
   (a) $x_1 = -3, x_2 = 3$  
   (b) $x_1 = -1, x_2 = 1$  
   (c) $x = 3$  
   (d) no solution!
   
7. The solutions of the quadratic equation $x^2 + 4x - 3 = 0$ are:
   (a) $x_1 = -1, x_2 = -3$  
   (b) $x_1 = 1, x_2 = 3$  
   (c) $x = 2 \pm \sqrt{7}$  
   (d) $x = -2 \pm \sqrt{7}$
   
8. Solve the following system of linear equations:
   
   \[
   \begin{align*}
   2x + 3y &= -5 \\
   -x + 2y &= -8
   \end{align*}
   \]
   (a) $(x, y) = (-2, 3)$  
   (b) $(x, y) = (2, -3)$  
   (c) $(x, y) = (0, 0)$  
   (d) no solution!
Part C: Functions and Their Graphs

1. Plot the points \( P_1 = (2, 3), P_2 = (-2, 3) \) and \( P_3 = (-1, -3) \):

   ![Graph of \( P_1, P_2, \) and \( P_3 \)]

2. Plot the straight line going through the points \( P_1 = (-2, -3) \) and \( P_2 = (1, 4) \).

   ![Graph of straight line through \( P_1 \) and \( P_2 \)]

3. Complete for \( f(x) = 3x - 1 \) the following table:

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>...</td>
</tr>
<tr>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>...</td>
<td>4</td>
</tr>
</tbody>
</table>

   ![Table completion for \( f(x) = 3x - 1 \)]
4. Which of the following graphs given below does not represent a function?
   (a) \( f(x) \)  (b) \( g(x) \)  (c) \( h(x) \)  (d) \( i(x) \)

5. The slope of the function \( f(x) \) given below is
   (a) 2  (b) \(-\frac{1}{2}\)  (c) \(-2\)  (d) \(\frac{1}{2}\)

6. The \( x \)-intercept of \( h(x) = -4x + 3 \) is:
   (a) \((x, y) = (0.75, 0)\)  (b) \((x, y) = (0, 3)\)  (c) \((x, y) = (3, 0)\)  (d) \((x, y) = (0, \frac{3}{4})\)

7. The \( y \)-intercept of \( h(x) = -4x + 3 \) is:
   (a) \((x, y) = (0, -3)\)  (b) \((x, y) = (3, 0)\)  (c) \((x, y) = (0, 3)\)  (d) \((x, y) = (0, 0.75)\)

8. The slope of the line defined by the equation \( 4x + 2y = 6 \) is:
   (a) 2  (b) \(-2\)  (c) 3  (d) \(-3\)
9. Graph the intervals $|x| < 3$ and $|x| \geq 2$.

10. Graph the solution set of the inequality $y + 2x > 1$:
Part D: Word Problems

1. Five times a number is 9 less than twice the same number. What is the number?
   
   (a) −5     (b) 2     (c) −3     (d) 4

2. For temperatures $T$, the conversion formula between the temperature scales Celsius $[^\circ\text{C}]$ and Fahrenheit $[^\circ\text{F}]$ is given by:
   
   $$T[^\circ\text{F}] = \frac{9}{5}T[^\circ\text{C}] + 32.$$ 

   On June 03, 2012, the highest temperature in Kabul was 30$^\circ\text{C}$. What was then the temperature in Fahrenheit?
   
   (a) $T = \frac{5}{9}F$     (b) $T = 86^\circ\text{F}$     (c) $T = -32^\circ\text{F}$     (d) $T = -\frac{9}{5}F$

3. Mahmud’s monthly salary has increased after a promotion by 20% to 24,000 Afs. What was his initial monthly salary?
   
   (a) 30,000 Afs     (b) 2,000 Afs     (c) 10,000 Afs     (d) 20,000 Afs

4. 150 students are registered for a College Algebra course of which 40% are female students. How many male students are taking this course?
   
   (a) 40     (b) 60     (c) 110     (d) 90

5. Ahmad has $x$ Afs in his pocket. First, he spends $\frac{1}{3}$ for a lunch in a restaurant and, then, he uses up $\frac{3}{4}$ of the remaining amount to buy fruit and vegetables for the family. If he still has 100 Afs left, what was then the initial amount $x$?
   
   (a) $x = 600$ Afs     (b) $x = 220$ Afs     (c) $x = 8000$ Afs     (d) $x = 120000$ Afs
Scratch Paper 4