Fall 2011 Exam 2A Key

1. C
2. A
3. C
4. B
5. D
6. a. [0, 5)
b. [-1, 5)
c. -1
d. 3
e. Yes

7. Graphically: Parallel lines
   Algebraically: You would get a false statement like 0 = 2
   No Solution

8. \[-4^{-2} = -\frac{1}{4^2} = -\frac{1}{16}\]

9. \[
   \frac{8x^3 + 24x^2 - 4x}{-4x} = \frac{8x^3}{-4x} + \frac{24x^2}{-4x} - \frac{4x}{-4x} = -2x^2 - 6x + 1
   \]

10. \[10x^3 + 15x^2y = 5x^2(2x + 3y)\]

11. \[15a^2 - 21a + 10a - 14 = 3a(5a - 7) + 2(5a - 7) = (5a - 7)(3a + 2)\]

12. Let \(x\) = number of true/false questions
    \(y\) = number of multiple choice questions
    \[x + y = 20\]
    \[3x + 11y = 100\]

13. Let \(x\) = speed of the plane in still air
    \(y\) = speed of wind
    \[2(x + y) = 600\]
    \[2.5(x - y) = 600\]

14. \[f(-1) = -(-1)^2 + 2(-1) - 5 = -1 - 2 - 5 = -8\]  B
15. 
\[3x + 2y = 6\]
\[2y = -3x + 6\]
\[y = \frac{-3}{2}x + 3\]
\[m = \frac{-3}{2}\]

\[m = \frac{2}{3}, (3, -2)\]

16. 
\[\left(\frac{2a}{b^2}\right)^2 = \frac{4a^2}{b^4} \cdot \frac{3^{-2}a^4b^{-6}}{1} = \frac{4a^2a^4}{3^2b^4b^6} = \frac{4a^6}{9b^{10}}\]

17. 
\[(a - 3b)^2 = (a - 3b)(a - 3b) = a^2 - 3ab - 3ab + 9b^2 = a^2 - 6ab + 9b^2\]

18. 
\[y^2 + 6y - 6 - (2y^3 - 4y) + (3y^2 + y + 1)\]
\[y^2 + 6y - 2y^3 + 4y + 3y^2 + y + 1\]
\[-2y^3 + 4y^2 + 11y - 5\]

19. 
\[
\begin{array}{c|cccc}
-3 & 2 & 5 & -4 & -5 \\
-6 & 3 & 3 & 2 & -1 \\
0 & 3 & 3 & 0 & -2 \\
\end{array}
\]

20. To solve using addition/elimination, multiply 1st equation by -2 and 2nd equation by 3.
\[3x - 5y = -2 \quad \text{multiply by -2} \quad -6x + 10y = 4\]
\[2x - 3y = 1 \quad \text{multiply by 3} \quad 6x - 9y = 3\]

\[\begin{align*}
\hline
& -3 & 2 & 5 & -4 & -5 \\
\hline
-6 & 3 & 3 & 0 & -2 \\
\hline
\end{align*}\]

Plug into one of original equations: \(2x - 3(7) = 1, \ 2x - 21 = 1, \ 2x = 22, \ x = 11\).
The solution is \((11, 7)\).
21. a. Find slope first: \[ m = \frac{38.9 - 31.1}{20 - 10} = \frac{7.8}{10} = .78 \]

Use slope and a point to get an equation of a line. Using point (10, 31.1), we get

\[
\begin{align*}
    y - 31.1 &= .78 (x - 10) \\
    y - 31.1 &= .78x - 7.8 \\
    y &= .78x + 23.3
\end{align*}
\]

b. The y-intercept is 23.3 (x = 0)

c. Interpretation: In 1980, 23.3% of females aged 25-29 had never been married.