Exam #4

Name: Solutions

NOTE: The figures in this exam may not be drawn to scale.

1) (3 points) Find the length of the hypotenuse of the right triangle shown below. Simplify the final answer as much as possible.

\[ 5^2 + 12^2 = x^2 \]
\[ 25 + 144 = x^2 \]
\[ 169 = x^2 \]
\[ \sqrt{169} = x \]
\[ 13 = x \]

2) (3 points) Find the length of the unknown side of the right triangle shown below. If the final answer is not a whole number, write it as a decimal rounded to two places.

\[ x^2 + 4^2 = 7^2 \]
\[ x^2 + 16 = 49 \]
\[ x^2 = 33 \]
\[ x = \sqrt{33} \]
\[ x \approx 5.74 \]

3) (3 points) Find the value of \( x \) indicated on the right triangle shown below. If the final answer is not a whole number, leave it as an unsimplified square root.

\[ x^2 + x^2 = 6^2 \]
\[ 2x^2 = 36 \]
\[ x^2 = 18 \]
\[ x = \sqrt{18} \]
(10 points) Completely factor each expression below. Write your final answers on the lines at the right.

(a) $x^2 - 4x - 21$  
   \[(x-7)(x+3)\]

(b) $9x^2 - 4y^2$  
   \[(3x+2y)(3x-2y)\]

(c) $18x^2 + 27x$  
   \[9x(2x+3)\]

(d) $2x^2 - 5x - 3$  
   \[(2x+1)(x-3)\]

(e) $6x^2 - 17x - 3$  
   \[(6x+1)(x-3)\]
5. (4 points) Solve the equation $x^2 + 5x = -6$.

\[ x^2 + 5x + 6 = 0 \]
\[ (x+2)(x+3) = 0 \]

Either
\[ x+2=0 \quad \text{or} \quad x+3=0 \]

\[ \boxed{x=-2} \quad \text{or} \quad \boxed{x=-3} \]

6. (4 points) Solve the equation $2x^2 + 5x - 12 = 0$.

\[ (2x - 3)(x + 4) = 0 \]

Either
\[ 2x-3=0 \quad \text{or} \quad x+4=0 \]
\[ 2x = 3 \]
\[ \boxed{x = \frac{3}{2}} \quad \text{or} \quad \boxed{x = -4} \]

7. (4 points) Solve the equation $x(x - 2) = 2(2 + x)$.

\[ x^2 - 2x = -4 + 2x \]
\[ x^2 - 4x + 4 = 0 \]
\[ (x - 2)^2 = 0 \]

So
\[ x - 2 = 0 \]
\[ \boxed{x = 2} \]
8. (1 point) Factor out the greatest common factor in the expression $6x^2y^3 - 9x^5y$.

$$3x^2y(2y^2 - 3x^3)$$

9. (1 point) If we know that the expression $x^2 + Ax + 36$ is a perfect square trinomial, what positive number is represented by the coefficient $A$?

$$(x+6)(x+6) = x^2 + 12x + 36$$

$A = 12$

10. (2 points) Completely factor the expression $x^3 + 3x^2 + 2x$.

$$x^3 + 3x^2 + 2x$$

$$x(x^2 + 3x + 2)$$

$$x(x + 1)(x + 2)$$