True or False: (1 point each)

Respond with either true or false to the following statements. There will be NO partial credit given in this section (assume all variables are positive real numbers).

1. \((a + b)^2 = a^2 + b^2\) \(\boxed{\text{False}}\)
   \((a+b)^2 = a^2 + 2ab + b^2\)

2. \(\frac{2^2}{y} = \frac{4}{y}\) \(\boxed{\text{False}}\)
   \(2^{-2} = \frac{1}{2^2} = \frac{1}{4}\) \(\text{no + -}\)

3. \(\sqrt{45} = 3\sqrt{5}\) \(\boxed{\text{True}}\)

4. \(\frac{3x}{\sqrt{3}} = x\sqrt{3}\) when rationalized \(\boxed{\text{False}}\)

5. The degree of the polynomial \(x^3 + 5x^4 + 1\) is 3. \(\boxed{\text{False}}\) \(4\) \(\text{(highest power)}\)

6. \(\sqrt{-12\sqrt{-27}} = 18\) \(\boxed{\text{False}}\)
   \(\sqrt{-12\sqrt{-27}} = \sqrt{2\sqrt{3} \cdot 3\sqrt{3}} = \sqrt{6} \cdot 3 = -18\)

Short Answer: (2 points each)

Complete the following problems. These problems are intended to have short answers. Partial credit will NOT necessarily be given.

7. Evaluate the variable expression for \(x = 2, y = -3\) and \(z = -1\):
   
   \(-x(z - y)^2 = -2(1 - (-3))^2 = -2(4) = -8\)

8. Simplify the variable expression: \(3(a - 4b) - (2a + b) = 3a - 12b - 2a - b = a - 13b\)

9. Write the exponential expressions in simplest form.

   (a) \(-\frac{48a^2b^{12}}{30a^6b^3} = \frac{8b^9}{5a^4}\) \(\text{subtract powers}\)

   (b) \(3x^{1/4} \cdot 2x^{2/4} = 6x^{1/4 + 2/4} = 6x^{3/4}\) \(\text{add powers}\)
Long Answer: (4 points each)
Complete the following problems. These problems are intended to have longer answers.
Please SHOW ALL WORK, since partial credit may be given based on that.

10. Simplify \( \frac{x^2 + x - 20}{3x + 15} = \frac{(x+5)(x-4)}{3(x+5)} = \frac{x-4}{3} \)

11. Solve each equation and check your solution(s) (checking solution is 1 point extra).
   
   (a) \(|x - 4| = 4\)
   \[ x - 4 = 4 \quad \text{or} \quad x - 4 = -4 \]
   \[ x = 8 \quad \text{or} \quad x = 0 \]
   \[ |8 - 4| = |4| = 4 \quad \text{or} \quad |0 - 4| = |-4| = 4 \]

   (b) \(2x^2 + 3x = 2\)
   \[ 2x^2 + 3x - 2 = 0 \]
   \[ (2x - 1)(x + 2) = 0 \]
   \[ 2x = 1 \quad \text{or} \quad x = -2 \]
   \[ x = \frac{1}{2} \quad \text{or} \quad x = -2 \]

   (c) \(\frac{3}{1+x} = \frac{4}{1-x}\)
   \[ 3(1-x) = 4(1+x) \]
   \[ 3 - 3x = 4 + 4x \]
   \[ -7x = 1 \quad \Rightarrow \quad x = -\frac{1}{7} \]
   \[ \frac{3}{1-\frac{1}{7}} = \frac{\frac{21}{7}}{\frac{6}{7}} = \frac{7}{2} \]

   (d) \(\sqrt{10-x} = 6\)
   \[ 10 - x = 36 \]
   \[ -x = 26 \quad \Rightarrow \quad x = -26 \]
   \[ \sqrt{10 - (-26)} = \sqrt{36} = 6 \]
12. Solve each inequality.

(a) \[2x - 5 \leq 11\]
\[2x \leq 16\]
\[x \leq 8\]

(b) \[|2x + 1| > 3\]
\[2x + 1 < -3\] or \[2x + 1 > 3\]
\[-2x < -2\] or \[2x > 2\]
\[x > 1\] or \[x < -1\]

13. A total of $7000 is deposited into two simple interest accounts. On one account the annual simple interest rate is 5%, and on the second account the annual simple interest rate is 7%. The amount of interest earned for 1 year was $450.

(a) If you call the amount invested in the 5% account \(x\), then how much was invested in the 7% account?

\[7000 - x\]

(b) How much interest, in terms of \(x\), was earned in each account?

\[0.05x\] and \[0.07(7000 - x)\]

(c) How much was invested in each account?

\[0.05x + 0.07(7000 - x) = 450\], so \((x) 100\)

\[5x + 7(7000 - x) = 45000\]

\[5x - 7x = -4000\]
\[-2x = -4000\]
\[x = 2000\]

$2000 in 5% account

$5000 in 7% account