

Polynomial Operations and Factoring

Name: _____

Date: _____

Instructions: Answer all questions to the best of your ability. Show all your work in the space provided for full credit.

1. Find all solutions to each of the following equations:

(10)

(a) $r^2 - 7r = 0$

(b) $x^2 + 3x = 7x - x^2$

(c) $2t^2 = 242$

(d) $16 - y^2 = -4$

2. Find all solutions to the equation $t^4 - 11t^2 + 18 = 0$.

(8)

Hint: Let $u = t^2$ and solve for u first.

3. Solve the inequality $m^2 + 6m + 5 \geq 0$, and graph the solutions on the number line. (10)

4. For what values of r is $2r^2 - 3r > -7$? (8)

5. Factor $x^4 + 4y^4$ (completely). (12)

6. Factor each of the following: (15)

(a) $a^3 + 27$

(b) $a^3b^3 + 8c^3$

(c) $2r^3 - 16$

(d) $1000 - x^6y^3$

7. (a) The expression $x^5 + y^5$ can be written as the product of $x + y$ and another factor. Find that other factor. (12)

- (b) The expression $x^7 + y^7$ can be written as the product of $x + y$ and another factor. Find that other factor.

- (c) Write $x^{2n+1} + y^{2n+1}$ as the product of two factors.

- (d) Why does the factorization in the previous part fail when the powers of x and y are even? In other words, why can we not factor $x^4 + y^4$ or $x^6 + y^6$ using the patterns we found in the first three parts?

8. Solve each polynomial equation by factoring: (10)

(a) $x^3 - 8 = 0$

(b) $x^3 + 64 = 0$

(c) $2x^3 - 16x = 0$

(d) $x^4 - 16 = 0$

9. Find the GCF of $54x^7t^3$, $90x^5t^2$, and $108x^4t$. (8)

(a) $18x^7t$

(b) $9x^2t$

(c) $540x^4t^3$

(d) $36xt$

10. A rectangle is twice as long as it is wide. If its length is increased by 4 cm and its width is decreased by 3 cm, the new rectangle formed has an area of 100 cm^2 . Find the dimensions of the original rectangle. (12)