Precalculus Summer Packet   Name:_____

Show all work as you perform the indicated operation.

1. $(2x^4 + 9x - 9) - (x^4 - 2x^2 + 4x - 8)$ 2. $(x^4 - x^3 + x^2 - x + 1) + (x + x^4 - 1 - x^2)$

3. $(2x + 7)(4x - 3)$ 4. $(2x - 5)^2$ 5. $(w + 4)(w^2 + 6w - 11)$

Factor the following expressions completely.

6. $2m^3 + 6m^2 - 8m$ 7. $3m^2 + 18m + 15$ 8. $x^2 - 9$

9. $x^3 + 5x^2 + 4x + 20$ 10. $5x^3 - 20x^2 - 25x$ 11. $2x^5 + 6x^4 + 2x^3 + 6x^2$

12. $x^4 - 7x^2 - 18$ 13. $18y^3 - 50y$ 14. $x^4 - 16$

Solve the equations, real and imaginary. Leave solutions in exact form.

15. $2x(4x + 3)(x - 5) = 0$ 16. $(x^2 + 9)(x^2 + 5) = 0$ 17. $8x^2 - 2x = 0$

Answer the following about the graphs of $f(x)$. Then sketch the graph using the zeros, multiplicity, and end behavior.

18. $f(x) = 2x^4 - 7x^3 + x^2 + 16x - 12$

19. $f(x) = 3x^2(x - 5)^3(x + 4)^4$

x-intercepts and multiplicity:

y-intercept:

end behavior:

$x \to -\infty, f(x) \to$ _____

$x \to \infty, f(x) \to$ _____

x-intercepts and multiplicity:

y-intercept:

end behavior:

$x \to -\infty, f(x) \to$ _____

$x \to \infty, f(x) \to$ _____
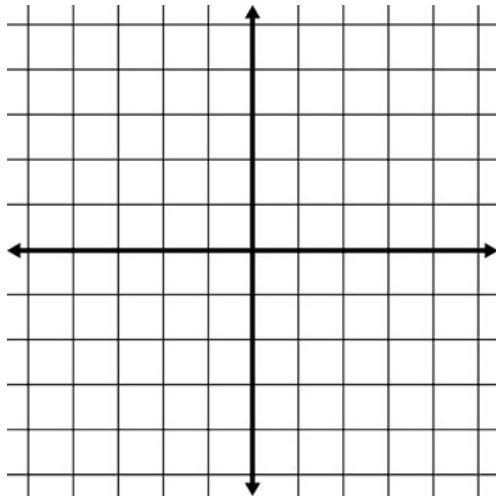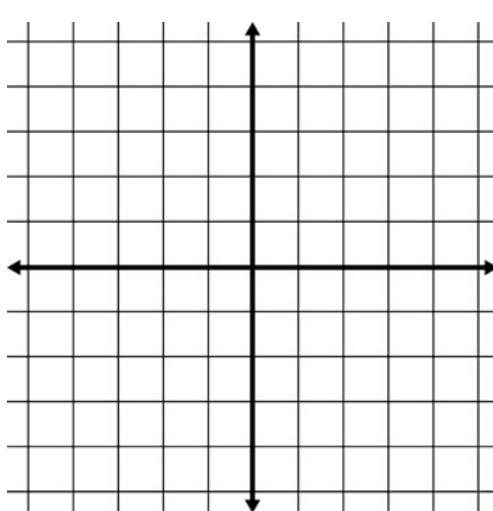
Simplify the expressions. Recall: $i^2 =$ _____

20. $(2 + 3i)(5 - 2i)$

21. $(3i + 5) - (5 - 2i)$

22. $(8i + 1) + (10i - 3)$

23. $(x - \sqrt{3})(x + \sqrt{3})$

24. $\sqrt{6} \cdot \sqrt{15}$

25. $(x - 1 + \sqrt{3})(x - 1 - \sqrt{3})$

Solve by the quadratic formula.

26. $x^2 - 2x - 4 = 0$

27. $x^2 - 4x + 13 = 0$

Write an equation of a polynomial in standard form with the given x-intercepts. Assume the leading coefficient is one.

28. $x = 3, 2i$

29. $x = -1, \sqrt{5}$

30. $x = 4, (1 - i)$