Math 111 Algebra Review

Please complete the following questions and check your solutions with other students. You will need to review old algebra notes. If your answers differ or you are unsure of your solutions, please ask me. Algebra will not be taught in this class but I am willing to clarify any unclear notions before we progress to calculus.

We will spend two (2) days on this handout and I will NOT go over every single question. Choose the questions (or the rules/laws) you want me to review wisely.

NOTE: Keep in mind that there is no such terminology as "factor completely" or "simplify completely". Factorization and simplification are always complete. That means if you can simplify further, you have not simplified.

Rewrite/simplify/factor:

1. $3^4 \cdot 3^2 = 3^6$
2. $x^5 \cdot x^2 = x^7$
3. $y \cdot y^3 \cdot y^5 = y^9$
4. $(3x^6)(5x) = 15x^7$
5. $(7z)(5z)^3 = 35(125z^3)(zz) = 875z^4$
6. $7^0 = 1$

7. $(2x+5)^0 = 1$

8. $3x^0 = 3(1) = 3$

9. $\frac{x^7}{x^4} = x^3$

10. $\frac{5^8}{5^2} = 5^6$

11. $\frac{20x^6}{4x^5} = 5x^2$

12. $\frac{12y^{10}z^7}{14y^8z^7} = \frac{6y^2}{7}$

13. $\frac{24a^{14}b^6}{18a^7b^4} = \frac{4}{3}a^7b^2$

14. $\frac{45x^{11}}{x^7} = 45x^4$

15. $\frac{3^9}{3^3} = 3^6 = 729$

16. $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

17. $(-4)^{-4} = \frac{1}{(-4)^4} = +256$

18. $2x^{-3} = \frac{2}{x^3}$

19. $(3x)^{-1} = \frac{1}{3x}$

20. $6^{-2} = \frac{1}{6^2} = \frac{1}{36}$

21. $(-2)^{-6} = \frac{1}{(-2)^6} = \frac{1}{64}$

22. $3x^{-5} = \frac{3}{x^5}$

23. $\frac{k^4}{k^{13}} = \frac{1}{k^9}$

24. $\frac{5^3}{5^5} = \frac{1}{5^2} = \frac{1}{25}$

25. $\frac{1}{z^{-8}} = z^8$

26. $\frac{x^{-9}}{x^2} = \frac{1}{x^{11}}$

27. $\frac{2^{-3}}{2^{-1}} = \frac{2^1}{2^3} = \frac{1}{2^2} = \frac{1}{4}$

28. $\frac{5p^{-4}}{p^{-3}} = \frac{5p^3}{p^4} = \frac{5}{p}$

29. $5x^3 - 30x^2 - 35x$ $= 5x(x^2 - 6x - 7)$
$= 5x(x-7)(x+1)$

30. $2n^2 - 38n + 80$ $= 2(n^2 - 19n + 40)$

31. $2x^2 + 11x + 15$ $= (2x+5)(x+3)$

32. $6x(3x-4)^5 + 45x^2(3x-4)^4 =$ $3x(3x-4)^4(6+45x)$
$3x(3x-4)^4(45x+6)$
$3x(3x-4)^4(15x+2)$

33. $8x^3(5x+1)^6 + 60x^4(5x+1)^5$
$= 4x^3(5x+1)^5(2(5x+1)^2 + 15x)$
$2(25x^2+10x+1)+15x$
$2(25x^2+25x+1)$
$= 4x^3(5x+1)^5(50x^2+35x+2)$

34. $10x^4(2x-3)^4 + 16x^5(2x-3)^3$

35. $6x^2 + 13x + 6 = (3x+2)(2x+3)$

36. $x^{\frac{3}{4}} = \sqrt[4]{x^3}$

37. $\left(\sqrt[6]{x}\right)^7 = \sqrt[6]{x^7} = x\sqrt[6]{x}$

38. $x^{\frac{9}{5}} = \sqrt[5]{x^9} = x\sqrt[5]{x^4}$

39. $\sqrt[4]{x^8} = x^{8/4} = x^2$

40. $729^{\frac{2}{3}} = \left(\sqrt[3]{729}\right)^2 = 9^2 = 81$