

INTERMEDIATE ALGEBRA
FINAL EXAM REVIEW

PART I:

1. Factor completely:
a) $6x^4y^3 + 8x^2y - 10x^3y^3$ b) $16x^6 - 36$ c) $8x^2 - 56x + 98$
2. Factor completely: $x^4 - 13x^2 + 36$
3. Divide: $\frac{3a-6}{5a+10} \div \frac{4a-8}{5}$
4. Use long division and write any remainder as a fraction. $\frac{12x^3 - 17x^2 + 10x - 3}{4x - 3}$
5. Simplify: $\frac{16m^4n^3p^5 - 32m^2n^5p^3 + 8m^2np^3}{-8m^2np^3}$
6. Subtract $(4 + 3a^3b^4 - a^4b^3)$ from $(12a^3b^4 - 6a^4b^3 - 6)$
7. Multiply: $(3m + n)$ by $(5m - 2n)$
8. Find the product of $(x^2 - 2)$ and $(4x^2 - 3x + 2x^3)$
9. Simplify: $8 - \{2 + 5[1 + 4(5 - 9) + 3(-2)]\}$
10. Simplify: $\frac{3 + (-6) - 8}{22(-4) \div (-8)}$
11. Solve algebraically: Twice a number, increased by 15, is equal to 3 times the number. Find the number.
12. Solve algebraically: Find three consecutive odd integers such that the product of the first two equals two more than the square of the largest number.
13. Solve algebraically: The length of a rectangle is 8 feet more than the width. The perimeter of the rectangle is 76 ft. Find the dimensions of the rectangle.
14. Simplify the following:
a) $\frac{x^2 - 10x + 25}{x^2 - 25}$ b) $\frac{2y - xy}{x^2 - 4}$
15. Multiply and simplify: $\frac{6x^3}{11y^2} \cdot \frac{22x^4y^4}{24}$

16. Divide and simplify: $\frac{2x^2 - 7x + 6}{2x^2 - 6x - 20} \div \frac{3 - 5x + 2x^2}{x^2 + x - 2}$

17. Add or subtract as indicated:

a) $\frac{7y-1}{y-9} - \frac{y+2}{2y-18}$ b) $y - \frac{y-3}{2}$ c) $\frac{3x}{x^2-4} + \frac{x}{x-2}$

18. Solve for the variable in each equation. All answers should be in simplest form.

a) $5y - (y - 2) = 6 + 7(y - 1)$

b) $\frac{3x}{4} + \frac{1}{6} = \frac{x}{3} - \frac{1}{2}$

c) $\frac{2x}{5} - \frac{x+2}{3} + 6 = 4x + 1$

d) $x^2 + 5x = 6$ (Solve by factoring)

e) $3x^2 + 2x - 2 = 0$ (Solve using the quadratic formula)

f) $n - \frac{3}{n} = \frac{26}{3}$ State any restrictions for n.

g) $1 + 6x > -17$ and graph your answer on a number line

19. Simplify the following. There should be no negative exponents in your answer.

a) $(ab^{-2})^{-3}(b^0m^4)^{-2}$ b) $\sqrt{24x^5y^8z^3}$ c) $(x^{-2})^{-2} \cdot (y^{-3})^2$

20. Find the distance, in simplified radical form, between the points (-3, -5) and (4, -6).

21. Find the x and y intercepts (as ordered pairs) of the equation $3x - y = -6$.

22. Find the slope of the line passing through the points (-3,1) and (6,4).

23. Find the slope and y-intercept of the equation $3y + 4x = 16$.

24. Find the equation of the line with slope $-\frac{3}{5}$ and passing through the point (3, -2). Put your answer in standard form.

25. a) Write this linear equation in slope intercept form: $2x + 3y = 9$. Identify the slope and the y intercept and then use that information to graph the line.

b) Graph $4x - 5y = -20$

26. Solve the system of equations *graphically* for x and y: $2x - 3y = 9$ and $3x + y = 8$
27. Solve the system of equations *algebraically* for x and y: a) $4x - 3y = -5$ b) $y = 3x + 5$
 $3x + 5y = -11$ $5x - 3y = 1$
28. Solve algebraically: The sum of two numbers is ten. The difference between them is four. What are the numbers?
29. Given the right $\triangle ABC$ with the right angle at C, side $c = 13$ and side $b = 12$, find side a.
30. Given right $\triangle ABC$ with the right angle at C, side $c = 5$ and side $b = 3$, find angle A to the nearest degree.
31. Given right $\triangle ABC$ with the right angle at C, $A = 50^\circ$ and $a = 6.2$, find side b to the nearest unit.
32. Simplify: a) $-\sqrt{49}$ b) $\sqrt{40}$ c) $\sqrt{54xy^2}$ d) $\sqrt{-16}$
33. Multiply and simplify: a) $(\sqrt{5x})(\sqrt{10xy^2})$ b) $(-3\sqrt{6})(4\sqrt{8})$
34. Simplify: a) $\sqrt{\frac{20}{45}}$ b) $\frac{\sqrt{5}}{\sqrt{3} + 2}$ c) $\frac{2 - \sqrt{3}}{-5 + \sqrt{2}}$
35. Perform the indicated operations and simplify: a) $\sqrt{80} - \sqrt{45} + \sqrt{27}$ b) $\sqrt{20a^2} - a\sqrt{45}$

PART II: Multiple Choice:

1. The product of $(6x - y)$ and $(3x + 4y)$ is
 a) $18x^2 + 27xy + 4y^2$ b) $18x^2 + 21xy - 4y^2$ c) $9x - 3y$ d) $18x$
2. $(10x^2 - 9x + 2) \div (2x - 1)$ is equivalent to
 a) $5x - 9 + 2$ b) $5x - 4\frac{1}{2}$ c) $5x - 2$ d) $8x - 1$
3. Simplify: $6 - \{4 + 2[3 + 6(6 - 7) + 2(-1)]\}$
 a) 10 b) 17 c) 12 d) 16
4. $(18xy^2 - 12x^2y + 6) - (17 - 9x^2y + 12xy^2)$ simplifies to
 a) $xy^2 - 21x^2y + 6$ b) $6xy^2 - 3x^2y - 11$ c) $11 - 9x^2y$ d) $23 + 9x^2y$
5. Distribute: $-3y^2\left(\frac{x}{3} - \frac{y^3}{6} + 7xy\right)$
 a) $-3xy^2 + 2y^6 - 10xy^3$ b) $2y^5 - 22xy^3$ c) $\frac{1y^5}{2} - 22x^2y^5$ d) $\frac{1y^5}{2} - xy^2 - 21xy^3$

6. Divide: $(14x^3y^2z^7 - 21x^2yz^4 + 28x^3y^4z^2) \div (7x^2yz)$
- a) $2xyz^6 - 3z^3 + 4xy^3z$ b) $2x^5y^3z^8 + 3z^3 + 4xy^3z$
- c) $2xy^3z - 3 + 4x^5yz$ d) $7xyz^6 - 28z^3 + 21xy^3z$
7. Add: $\frac{2}{a} + \frac{8}{3b}$
- a) $\frac{10}{a+3b}$ b) $\frac{10}{3ab}$ c) $\frac{2b+8a}{3ab}$ d) $\frac{6b+8a}{3ab}$
8. Solve for x: $x - 5(x + 2) = 10 - 2(x - 1)$
- a) $-\frac{1}{6}$ b) 1 c) 11 d) -11
9. Solve for x: $\frac{x}{3} - \frac{x-6}{4} + 1 = 3x$
- a) $-\frac{6}{35}$ b) $\frac{6}{7}$ c) $\frac{1}{6}$ d) 6
10. An algebraic expression for the sum of two numbers, a and b, decreased by half of their product is:
- a) $\frac{a+b}{\frac{1}{2}ab}$ b) $\frac{1}{2}ab(a+b)$ c) $\frac{2(a+b)}{ab}$ d) $a+b - \frac{ab}{2}$
11. Which of the following ordered pairs satisfies the equation $3x - y = 2$?
- a) (4,-9) b) (2,4) c) (-1,1) d) (4,9)
12. Express in simplest form: $\frac{ab-ac}{c^2-b^2}$
- a) $\frac{a}{b+c}$ b) $\frac{a}{c-b}$ c) $\frac{a}{b-c}$ d) $-\frac{a}{b+c}$
13. Solve the system of equations for y: $x + 2y = 5$ and $3x - y = 1$
- a) $\frac{3}{2}$ b) 2 c) $-\frac{3}{5}$ d) 1
14. Solve the system of equations for x: $2x - 3y = 20$ and $3x + 5y = 11$
- a) 7 b) -2 c) 133 d) 31

15. Add and simplify: $\frac{8y}{y^2 - 9} + \frac{4}{y - 3}$
- a) $\frac{12y + 12}{y^2 - 9}$ b) $\frac{4(y + 1)}{y^2 - 3}$ c) $\frac{4y - 12}{y^2 - 9}$ d) $\frac{12y^2 + 24y + 3}{y^2 - 9}$
16. Factor *completely*: $27x^3y^4 - 9x^2y^2 + 3x^3y^3$
- a) $3x^3y^3(9y - 3)$ b) $9x^2y^2(3xy^2 - 1 + xy)$
c) $3x^2y^2(9xy^2 - 3 + xy)$ d) $3x^2(9xy^2 + 3y + xy)$
17. When *completely* factored, *one* of the binomial factors of $2x^2 + 6x - 36$ is:
- a) $x - 3$ b) $2x + 12$ c) $x + 2$ d) $x + 1$
18. Factor *completely*: $16x^4 - 9$
- a) $(4x^2 - 3)(4x^2 - 3)$ b) $(4x^2 - 3)(4x^2 + 3)$
c) $(16x^2 - 3)(x^2 - 3)$ d) $(16x^2 - 3)(x^2 + 3)$
19. Simplify completely: $\frac{a^2 + 6a + 9}{a^2 - 9}$
- a) $6a$ b) 1 c) -1 d) $\frac{a + 3}{a - 3}$
20. Multiply and simplify: $\frac{5m^4}{12r^2} \cdot \frac{3m^2r}{35}$
- a) $\frac{m^8}{28r}$ b) $\frac{m^6r^3}{28}$ c) $\frac{175m^2}{36r^3}$ d) $\frac{m^6}{28r}$
21. Divide and simplify: $\frac{4 - 2t}{3s - 6} \div \frac{2t - 4}{3}$
- a) $\frac{1}{s - 2}$ b) $\frac{-1}{s - 2}$ c) $\frac{-4t^2 + 16t - 16}{9s - 8}$ d) $\frac{1}{s - 6}$
22. Simplify. There should be no negative exponents in your answer: $(a^0x^{-2})^{-2} \cdot (y^{-3})^2$
- a) x^4y^6 b) $\frac{x^4}{a^2y^6}$ c) $\frac{x^4}{y^6}$ d) $\frac{1}{ax^4y^6}$

23. The slope of the equation $4x + 3y = 2$ is
- a) $-\frac{4}{3}$ b) $\frac{2}{3}$ c) -4 d) $-\frac{1}{2}$
24. The x intercept of the equation $3x - 2y = 6$ is
- a) $(2, 0)$ b) $(3, 0)$ c) $(-3, 0)$ d) $\left(\frac{1}{3}, 0\right)$
25. Find the equation, in standard form, of the line which passes through the points $(4, -1)$ and $(-3, 2)$
- a) $4x - 3y = -5$ b) $3x + 7y = 5$ c) $-3x + 4y = -5$ d) $3x - 5y = -2$
26. Find the equation of the line, in standard form with slope $\frac{1}{3}$ and which passes through the point $(-3, 4)$
- a) $x + 3y = -5$ b) $4x - 3y = -1$ c) $x - 3y = -15$ d) $3x - 5y = -2$
27. Factor *completely*: $x^4 - 9x^2 + 20$
- a) $(x^2 + 4)(x^2 + 5)$ b) $(x^2 + 4)(x^2 - 5)$ c) $(x + 10)^2$
- d) $(x^2 - 5)(x + 2)(x - 2)$ e) $(x^2 + 4)(x^2 - 5)$
28. Simplify $\sqrt{150y^2}$
- a) $25y\sqrt{6}$ b) $5y\sqrt{6}$ c) $10y\sqrt{6}$ d) $10y\sqrt{5}$
29. Divide and simplify: $\frac{\sqrt{32}}{\sqrt{18}}$
- a) $\sqrt{14}$ b) $\sqrt{\frac{16}{9}}$ c) $\frac{4}{3}$ d) $\frac{\sqrt{64}}{6}$
30. Add and simplify: $\sqrt{108} + \sqrt{147}$
- a) $\sqrt{255}$ b) $13\sqrt{6}$ c) $42\sqrt{3}$ d) $13\sqrt{3}$
31. Multiply and simplify: $(\sqrt{5a^3b})(\sqrt{10ab^4})$
- a) $25ab\sqrt{2}$ b) $5a^2b^2\sqrt{2b}$ c) $15ab\sqrt{5}$ d) $5a^4b^4\sqrt{b}$

INTERMEDIATE ALGEBRA**PART I: ANSWERS**

1. a) $2x^2y(3x^2y^2 + 4 - 5xy^2)$ b) $4(2x^3 + 3)(2x^3 - 3)$ c) $2(2x - 7)(2x - 7)$ or $2(2x - 7)^2$

2. $(x + 3)(x - 3)(x + 2)(x - 2)$

3. $\frac{3}{4(a + 2)}$

4. $3x^2 - 2x + 1$

5. $-2m^2n^2p^2 + 4n^4 - 1$

6. $9a^3b^4 - 5a^4b^3 - 10$

7. $15m^2 - mn - 2n^2$

8. $2x^5 + 4x^4 - 7x^3 - 8x^2 + 6x$

9. 111

10. -1

11. 15

12. -3, -1, 1

13. width is 15; length is 23

14. a) $\frac{x-5}{x+5}$ b) $\frac{-y}{x+2}$

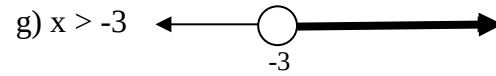
15. $\frac{x^7y^2}{2}$

16. $\frac{x-2}{2(x-5)}$

17. a) $\frac{13y-4}{2(y-9)}$ b) $\frac{y+3}{2}$ c) $\frac{x(x+5)}{(x+2)(x-2)}$

18. a) $y = 1$ b) $x = -\frac{8}{5}$ c) $x = \frac{65}{59}$ d) $x = 1, -6$ e) $\frac{-1 \pm \sqrt{7}}{3}$

f) restriction: $0; x = -\frac{1}{3}$ or 9



19. a) $\frac{b^6}{a^3m^8}$ b) $2x^2y^4z\sqrt{6xz}$ c) $\frac{x^4}{y^6}$

20. $5\sqrt{2}$

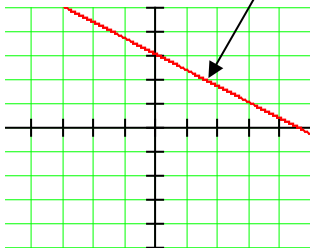
21. x intercept: $(-2,0)$; y intercept: $(0,6)$

22. $m = \frac{1}{3}$

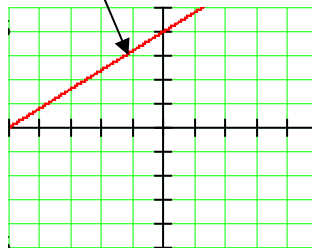
23. $m = -\frac{4}{3}; b = \frac{16}{3}$

24. $3x + 5y = -1$

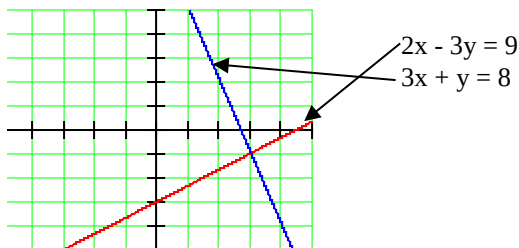
25. a) $y = -\frac{2}{3}x + 3$ $2x + 3y = 9$



b) $4x - 5y = -20$



26. the lines intersect at $(3, -1)$



27. a) $(-2, -1)$ b) $(-4, -7)$

28. 3 and 7

29. $a = 5$

30. $A = 53^\circ$

31. $b = 5$

32. a) -7 b) $2\sqrt{10}$ c) $3y\sqrt{6x}$ d) not a real number
33. a) $5xy\sqrt{2}$ b) $-48\sqrt{3}$
34. a) $\frac{2}{3}$ b) $-\sqrt{15} + 2\sqrt{5}$ c) $\frac{-10 - 2\sqrt{2} + 5\sqrt{3} + \sqrt{6}}{23}$
35. a) $\sqrt{5} + 3\sqrt{3}$ b) $-a\sqrt{5}$

PART II: ANSWERS

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|-------|-------|-------|-------|-------|-------|-------|
| 1) b | 2) c | 3) c | 4) b | 5) d | 6) a | 7) d |
| 8) d | 9) b | 10) d | 11) b | 12) d | 13) b | 14) a |
| 15) a | 16) c | 17) a | 18) b | 19) d | 20) d | 21) b |
| 22) c | 23) a | 24) a | 25) b | 26) c | 27) d | 28) b |
| 29) c | 30) d | 31) b | | | | |