

INTERMEDIATE ALGEBRA SAMPLE FINAL EXAM QUESTIONS
SHOW ALL CALCULATIONS. SIMPLIFY ANSWERS. PAGE 1 OF 6.

- (5 points) 1. Find the **slope-intercept equation** of the line **parallel** to the line with equation $5x - 8y = 80$ and passing through the point $(16, -10)$
- (3 points) 2. Let x be weekly sales in dollars, and y be weekly salary in dollars.
Find an equation in the form $y = mx + b$ if Bob earns **\$550** on sales of **\$10,000** one week, and **\$510** on sales of **\$9000** the next week.
- (4 points) 3. Factor (a) $125x^3 - 8y^3$
- (4 points) (b) $3x^3 + 2x^2 - 75x - 50$
4. **Solve** the equations by **factoring**
- (5 points) (a) $x^3 - 6x^2 - 16x = 0$
- (5 points) (b) $15x^2 + 13x - 6 = 0$
5. **Solve** the system
$$\begin{aligned} 9x - 14y &= 23 \\ 6x - 35y &= 8 \end{aligned}$$
- (6 points) (a) using **Cramer's Rule**
- (6 points) (b) using an **augmented matrix and row operations**
- (2 points) 6. State **how many solutions** the following system Has.
$$\begin{aligned} 2x - 3y &= 1 \\ 6x - 9y &= 3 \end{aligned}$$
- (2 points) 7. Which of the numbers π , $\sqrt{3.6}$, $\sqrt{0.36}$, 0 are irrational?
- (5 points) 8. Solve $2x + 9 < 5x - 3$ and write the solution in interval notation.

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(6 points) 9. Solve $|x - 3| \leq 7$ and write the solution in interval notation.

(6 points) 10. **Simplify** and write with **positive** exponents only.

$$\frac{(6x^{-2}y^3)^{-4}}{(3x^4y^{-3})^{-2}}$$

In the word problems, use appropriate algebra to solve. Check. Answer with sentence.

(6 points) 11. The sum of three consecutive integers is 90. Find the integers.

(6 points) 12. A rectangle has perimeter 58 ft. The length is 10 ft more than the width.
Find the dimensions.

(6 points) 13. \$8000 was invested for one year, part at 5% and part at 8%.
The total interest was \$595. How much was invested at each rate?

(6 points) 14. A train, travelling at 50 mi/hr, leaves for a certain town. $1\frac{1}{2}$ hours later, a bus,
travelling at 65 mi/hr leaves from outside the train station and follows a road
beside the tracks, arriving in the next town at the same time as the train.
How far did they travel, and for how long did the bus travel?

(4 points) 15. Solve for b in $-5b + 2 = 3(a + ab)$

(5 points) 16. Find the **range** of the function $y = x^2 - 3$

(2 points) 17. Find x so that the relation $\{(x, 3), (4, 5), (7, 9)\}$ is **not** a function

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(6 points) 18. Find the complete quotient using **synthetic division**

$$x - 5 \overline{) 2x^3 - 13x^2 + 21x + 1}$$

19. Let $f(x) = \frac{5-3x}{2}$ and $g(x) = \frac{2x+3}{2x-1}$ Find

(6 points) (a) the **composition**, $g \circ f(x)$

(6 points) (d) the **inverse function**, $f^{-1}(x)$

(6 points) (e) the **inverse function**, $g^{-1}(x)$

(2 points) (f) the **domain** of g

(2 points) (f) the **range** of g

(4 points) 20. Is the relation $x^4 + y^5 = 16$ a **function**? Explain your answer.

(4 points) 21. Is the function $5x^2 + 4y = 16$ **one-to-one**? Explain your answer.

22. Consider the quadratic function $y = x^2 + 12x - 5$ Find

(2 points) (a) the **y-intercept**

(6 points) (b) the **x-intercepts**, accurate to three decimal places

(6 points) (c) the **vertex**

(4 points) (d) the **range** of the function.

(6 points) 23. Find all complex number solutions to $2x^2 - 10x + 34 = 0$

24. Find exact values for

(2 points)

(a) $\log_{49}(343)$

(4 points)

(b) $e^{3.5 \ln 25}$

(8 points)

25. In a **arithmetic** sequence $a_1 = 15$ and $d = 9$

(a) Find a_{20} .

(b) Find the finite sum $a_1 + a_2 + \dots + a_{19} + a_{20}$

(10 points)

26. We deposit \$2,000 every Jan. 1 into an account earning 4% compounded annually, find the **future amount** in the account as of the 24th deposit.

27. A bacterial population grows exponentially. There were 1.50 grams of bacteria to start. After 10 days there are 3.50 grams.

(6 points)

(a) Find the **growth constant**, k , in the formula $P = P_0 \cdot e^{kt}$

(6 points)

(b) Find the **doubling time**, to the nearest hundredth of a day.

(6 points)

28. (a) Find the **distance** between the two points $A(2, -2)$ and $B(-3, 10)$.

(6 points)

(b) Find the **standard equation** of the **circle** through **B**, with **center** at **A**

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(8 points) 29. In a **geometric** sequence $a_3 = 5$ and $a_6 = 135$

Find a_1 and r .

(8 points) 30. Compute $\sum_{k=0}^{25} \frac{50}{(1.04)^k}$ to two decimal places.

(Hint: Write out the first few terms, to identify a and r correctly.)

(8 points) 31. Find the first **five** terms in the **binomial** expansion of $(1 - x)^{15}$.

(8 points) 32. An **ellipse** is centered at the origin, has **foci** at $(\pm 4, 0)$ and has **x-intercepts** at $(\pm 7, 0)$. Find the equation in standard form.

33. A substance decays exponentially and has a **half-life** of **40.0 days**.

(2 points) (a) When will there be only **one-thirtysecond** of the original amount?

(6 points) (b) When will there be only **5%** of the original amount.
(To nearest tenth of a day.)

(6 points) (c) What percent of the original amount is left after **120** days?
(To nearest tenth of a percent.)

(3 points) 34. Solve the inequality $-2x^2 - 9x + 7 \geq 0$

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(5 points) 35. Solve $\frac{x+4}{x^2+5x-6} + \frac{x}{x-1} = \frac{22}{x+6}$

(3 points) 36. Find the quotient $\frac{5-3i}{4+7i} =$

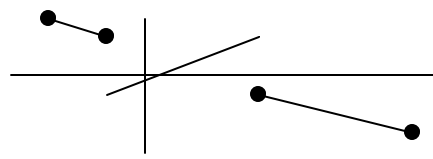
(11 points) 37. Determine if each of the relations below is a **function or not**, giving a **valid reason** in each case. **If** the relation is a function, also state if the function is **one-to-one**, or not, giving a valid reason.

(a) $\{(4, 3), (3, 4), (5, 5), (2, 3), (1, 4)\}$

(b) $|3x + 5y| = 15$

(c) $|3x + 5y| = 0$

(d)



(7 points) 38. A motorboat can travel at **14 miles per hour** in still water. The boat travels to a point **24 miles** upriver and runs out of gas, floating back to its starting point **14 hours** after leaving it. **Find the speed of the current.** Use algebra, including an appropriate equation, check, and sentence answer.

(8 points) 39. On graph paper, draw a large accurate graph of
(a) $y = \log_2(x + 2)$

(b) $y = x^3 - 4x$

(5 points) 40. How much money must be deposited in an account earning **4%** compounded annually, to produce an income of **\$100,000** per year, for exactly **ten** years, starting at the end of the first year?

(100 points total.)