

Math 11000 Exam Jam

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1 Algebra Review

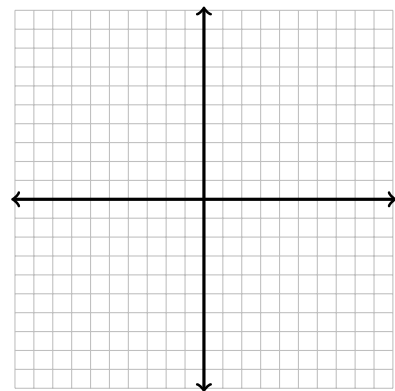
1. Evaluate $-x^2 - 7x$ when $x = -3$.

2. Solve for x .

$$8x - (4x + 5) = 19$$

3. Find the slope and the y -intercept of the equation. Also graph the line.

$$2x + 3y = 6$$



4. Simplify.

$$(8x^4 + 7x^3 - 2) - (2x^3 + x^2 - 3)$$

5. Multiply.

$$(2x - 3)^2$$

6. Factor completely. If it is prime, state this.

$$18t^5 - 12t^4 + 6t^3$$

7. Perform the indicated operation. Then, if possible, simplify.

$$\frac{2-x}{5x^2} \div \frac{x^2-4}{3x}$$

2 Functions and Graphs

8. Find the function values.

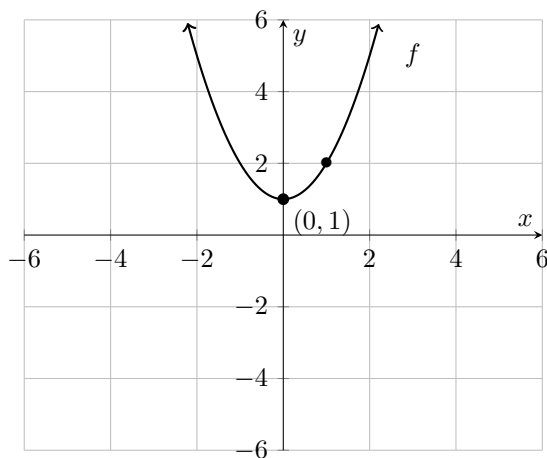
$$f(n) = 5n^2 + 4n$$

(a) $f(-1)$

(b) $f(3)$

(c) $f(2a)$

9. For the graph of a function, f , determine the domain and range of f and find $f(1)$ where $f(x) = x^2 + 1$.



10. In 2000, the life expectancy of females born in that year was 79.7 years. In 2010, it was 81.1 years. Let $E(t)$ represent life expectancy and t the number of years since 2000.

- (a) Find a linear function that fits the data.
- (b) Use the linear function of part (a) to predict the life expectancy of females in 2020.

11. Let $F(x) = x^2 - 2$ and $G(x) = 5 - x$. Find the following:

- (a) $(F + G)(3)$
- (b) $(F \cdot G)(x)$

12. Find the variation constant and an equation of variation if $y = 5$ when $x = 20$ and...

- (a) y varies directly as x .
- (b) y varies inversely as x .

3 Exponents and Radicals

13. Simplify. Variables may represent any real number, so remember to use absolute-value notation when necessary. If a root cannot be simplified, state this.

$$\sqrt{y^2 + 16y + 64}$$

14. Use rational exponents to simplify. Do not use fraction exponents in the final answer. Write the answer using radical notation.

$$\sqrt[12]{a^6}$$

15. Simplify. Assume that no radicands were formed by raising negative numbers to even powers.

(a) $\sqrt{45}$

(b) $\sqrt{120}$

(c) $\sqrt{6}\sqrt{33}$

16. Rationalize the denominator.

$$\sqrt{\frac{5}{8}}$$

4 Quadratic Functions and Equations

17. Solve by factoring and using the principal of zero products.

(a) $x^2 + 4x - 21 = 0$

(b) $64 + x^2 = 16x$

(c) $4t^2 = 8t$

18. Solve for x .

$$4x^2 - 12 = 0$$

19. Solve. (Find all complex-number solutions.)

$$(t + 5)^2 = 12$$

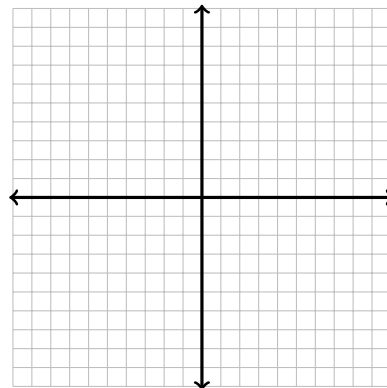
20. Let $f(x) = 6x^2 - 7x - 20$. Find x such that $f(x) = 0$.

21. A number is 6 less than its square. Find all such numbers.

22. The distance an object travels in a straight line is given by the function $S(t) = t^2 - 8t$, where S is in feet and t is the number of seconds the object has been in motion. How long does it take the object to move 9 feet?

23. Graph the function and find the vertex, the axis of symmetry, and the maximum value or the minimum value.

$$h(x) = -2(x - 1)^2 - 3$$



24. Find any x -intercepts and the y -intercept. If no intercepts exist, state this.

$$f(x) = x^2 - 6x + 3$$

25. Find the vertex.

$$f(x) = 3x^2 - 12x + 8$$

26. Sweet Harmony Crafts has determined that when x hundred dulcimers are built, the average cost per dulcimer can be estimated by

$$C(x) = 0.1x^2 - 0.7x + 2.425$$

where $C(x)$ is in hundreds of dollars. What is the minimum average cost per dulcimer and how many dulcimers should be built in order to achieve that minimum?

5 Exponential and Logarithmic Functions

27. Given $f(x) = 5x + 1$ and $g(x) = x^2$, find:

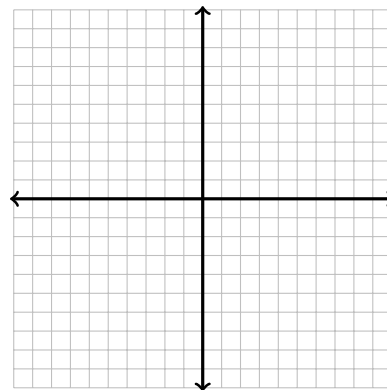
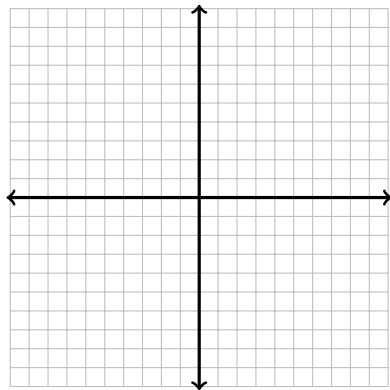
(a) $(f \circ g)(2)$

(b) $(g \circ f)(x)$

28. Graph.

(a) $f(x) = 3^x$

(b) $g(x) = \left(\frac{1}{4}\right)^x$



29. Solve.

$$\log_2 32 = x$$

30. Express as an equivalent expression, using the individual logarithms of x , y , and z .

$$\log_a \frac{x^5}{y^3 z}$$

31. Use a calculator to find each of the following to four decimal places.

(a) $\log 7$

(b) $\ln 9$

(c) $e^{2.71}$

32. Solve for x . Approximate to three decimal places if necessary.

(a) $4^{x+1} = 16$

(b) $3^{2x} = 2$

(c) $10^{x-3} = 5$

(d) $6e^{0.05x} = 18$

33. Suppose that P_0 is invested in a savings account where interest is compounded continuously at 3% per year.

(a) Express $P(t)$ in terms of P_0 and 0.03.

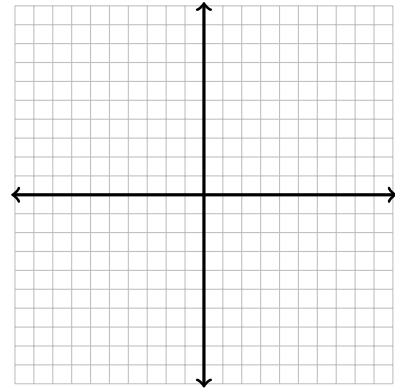
(b) Suppose that \$5000 is invested. What is the balance after 1 year? after 2 years?

(c) When will an investment of \$5000 double itself?

6 Systems of Linear Equations

34. Solve the system graphically. Be sure to check your solution. If a system has an infinite number of solutions, use set-builder notation to write the solution set. If a system has no solution, state this.

$$\begin{aligned}y - x &= 5, \\ 2x - 2y &= 10\end{aligned}$$



35. Solve using the substitution method.

$$\begin{aligned}3s - 4t &= 14, \\ 5s + t &= 8\end{aligned}$$

36. Ellen wishes to mix candy worth \$1.80 per pound with candy worth \$2.40 per pound to form 48 pounds of a mixture worth \$2.00 per pound. How many pounds of the more expensive candy should she use?

37. Solve each system. If a system's equations are dependent or if there is no solution, state this.

$$\begin{aligned}x - y - z &= 1, \\2x + y + 2z &= 4, \\x + y + 3z &= 5\end{aligned}$$

38. The sum of three numbers is 85. The second is 7 more than the first. The third is 2 more than four times the second. Find the numbers.

39. For the following pair of total-cost and total-revenue functions, find the total-profit function and the break-even point.

$$C(x) = 15x + 3100,$$

$$R(x) = 40x$$

7 Inequalities

40. Solve algebraically.

$$5(t - 3) + 4t < 2(7 + 2t)$$

41. Find the indicated intersection.

$$\{2, 4, 16\} \cap \{4, 16, 256\}$$

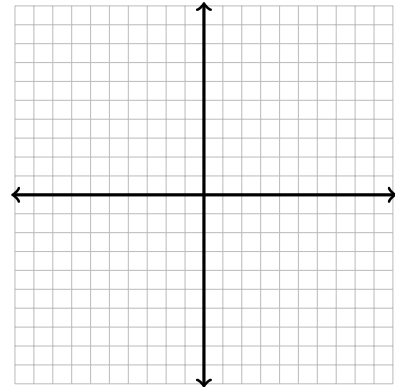
42. Solve and graph the solution set, where $f(t) = 5t + 3$.

$$f(t) < -7 \text{ or } f(t) > 8$$

43. Solve and graph $4x - 1 < 7$ and $1 - 3x \leq -5$.

44. Graph.

$$\begin{aligned}x + y &\leq 6, \\x - y &\leq 4\end{aligned}$$



45. Maximize $F = 6x + 7y$
subject to:

$$\begin{aligned}2x + 3y &\leq 12 \\2x + y &\leq 8 \\x &\geq 0 \\y &\geq 0\end{aligned}$$

8 Logic and Truth Tables

46. Let p represent the statement “She has green eyes” and let q represent the statement “He is 60 years old.” Translate the symbolic compound statement into words.

$$\sim p \vee \sim q$$

47. Construct a truth table for the compound statement.

$$(q \vee \sim p) \vee \sim q$$

48. Construct a truth table for the statement. Identify whether or not it is a tautology.

$$\sim q \rightarrow p$$

49. For the given conditional statement, write (a) the converse, (b) the inverse, and (c) the contrapositive in *if ... then* form.

$$p \rightarrow \sim q$$

50. Use a truth table to determine whether the argument is valid or invalid.

$$\frac{p \rightarrow q}{\frac{q \rightarrow p}{p \wedge q}}$$

51. Negate the statement: Not all people like football.

52. Let p represent the statement “Today is Saturday” and let q represent the statement “I will go to the movies.” Translate the symbolic compound statement into words.

$$\sim p \vee q, \sim (p \wedge q), p \rightarrow q, \text{ and } \sim p \leftrightarrow q$$

53. Use DeMorgan’s Laws to negate the statement: It is Saturday and it is not raining.

54. Write the contrapositive, converse, and inverse of the conditional statement: If I were young, I would be happy.