

Here are some things to look at as you prepare for the exam. Remember to look at quizzes and homework problems also. The problems below will help you understand the concepts covered on the exam. Try to do as many of these as you can without looking in your notes or book for guidance.

1. Solve for x : $4 - 5x = 9$
2. Solve for x : $(x - 3)(x - 2) = 0$
3. Solve for x : $8x^2 = 8x - 3$
4. Solve for b : $(b + 7)^2 = 5$
5. Solve for k : $9k^2 + 6k = 2$
6. Find the x -intercept(s) and y -intercept of $x - 2y = 3$
7. Find the x -intercept(s) and y -intercept of $y = x^2 - 9$
8. For each of the following, find the equation of a line satisfying the specified conditions:
 - (a) Through $(-1, 4)$ and $(2, 3)$
 - (b) Through $(5, -3)$ and perpendicular to $x = 3y$
 - (c) Through $(7, 11)$ and parallel to $3x + 8y = 0$
 - (d) with x -intercept -3 and y -intercept 5
9. Chris and Josh have received walkie-talkies for Christmas. If they leave from the same point at the same time, Chris walking north at 2.5 mph and Josh walking east at 3 mph, how long will they be able to talk to each other if the range of the walkie-talkies is 4 miles? Round your answer to the nearest minute.
10. A plane flies nonstop from New York to London, cities which are about 3500 miles apart. After one hour and 6 minutes in the air, the plane passes over Halifax, Nova Scotia, which is 600 miles from New York. Estimate the flying time from New York to London.
11. On vacation, Le Hong averaged 50 mph traveling from Denver to Minneapolis. Returning by a different route that covered the same number of miles, he averaged 55 mph. What is the distance between the two cities if his total traveling time was 32 hours?
12. Joan wants to buy a rug for a room that is 12 feet by 15 feet. She wants to leave a uniform strip of floor around the rug. She can afford 108 square feet of carpeting. What dimensions should the rug have?

13. Deer ticks cause concern because they can carry Lyme disease. One study found a relationship between the density of acorns produced in the fall and the density of deer tick larvae the following spring. The relationship can be approximated by the linear equation

$$y = 34x + 230$$

where x is the number of acorns per square meter in the fall and y is the number of deer tick larvae per 400 square meters the following spring. According to this formula, approximately how many acorns per square meter would result in 1000 deer tick larvae per 400 square meters?

14. One car rental firm charges \$75 for a weekend rental (Friday afternoon through Monday morning) with unlimited mileage. A second firm charges \$50 plus 5 cents per mile. For what range of miles driven is the second firm cheaper?
15. State the definition of function.
16. Be able to graph functions and find their x - and y -intercepts.
17. Which of the following define a function? Explain.

- (a) $y = \sqrt{x}$
- (b) $x = y^2 + 1$
- (c) $x = |y|$
- (d) $y = |x|$

18. For each of the following functions, find

$$f(6) \qquad f(-2) \qquad f(p) \qquad f(r+1) \qquad f(k-5) \qquad f(x+h)$$

- (a) $f(x) = 4x - 1$
- (b) $f(x) = -x^2 + 2x - 4$
- (c) $f(x) = 8 - x - x^2$
- (d) $\frac{x^2 + 2}{x - 6}$

19. Let $f(x) = x^2 + x + 1$. Find each of the following:

- (a) $f(3)$
- (b) $f(1)$
- (c) $f(4)$
- (d) Based on your answers above, is it true that $f(a + b) = f(a) + f(b)$ for all real numbers a and b ?

20. Be able to find the vertex of a quadratic function by completing the square.

21. Graph the following polynomial functions:

- (a) $f(x) = x^3 - x$
- (b) $f(x) = x(x - 2)(x + 3)$

(c) $f(x) = x^4 - 7x^2 - 8$

22. For the following functions, do the following:

- Find the vertical asymptotes.
- Find the horizontal asymptote
- Find the x -intercepts
- Graph the function

(a) $f(x) = \frac{1}{x-3}$

(b) $g(x) = \frac{5x-2}{4x^2-4x+3}$

(c) $h(x) = \frac{x^2-4}{x+2}$

23. If it costs \$300 to produce 8 units, and the fixed costs are \$60, find:

- the linear cost function
- the marginal cost
- the average cost per unit to produce 100 units

24. If the fixed costs are \$2000, and 36 units cost \$8480 to make, find:

- the linear cost function
- the marginal cost
- the average cost per unit to produce 100 units

25. If it costs \$445 to make twelve units, and \$1585 to make 50 units, find:

- the linear cost function
- the marginal cost
- the average cost per unit to produce 100 units

26. The cost of producing x ink cartridges for a printer is given by $C(x) = 24x + 18,000$. Each cartridge can be sold for \$28.

- What are the fixed costs?
- Find the revenue function.
- Find the profit function.
- Find the break-even point.
- If the company sells exactly the number of cartridges needed to break-even, what is its revenue?

27. Suppose the demand and price for the HBO cable channel are related by $p = -0.5q + 30.95$, where p is the monthly price in dollars, and q is measured in millions of subscribers. If the price and supply are related by $p = 0.3q + 2.15$, what are the equilibrium quantity and price?

28. For the following functions, answer the following questions:

- Does the parabola open up or down?
 - What is the vertex?
 - What is the axis of symmetry?
 - What are the x -intercepts?
 - What is the y -intercept?
- (a) $f(x) = x^2 + 6x - 2$
- (b) $f(x) = -4x^2 + 8x + 3$
29. Suppose an investor kept track of the profit, P , she made on her portfolio. At time t months after she began investing, $P(t) = -4t^2 + 32t - 20$. At what time is her profit largest?
30. The height h (in feet) of a rocket at t seconds after liftoff is given by $h = -16t^2 + 800t$.
- (a) How long does it take the rocket to reach 300 feet?
- (b) What is the maximum height of the rocket?
31. A cost-benefit curve for pollution control is given by
- $$y = \frac{9.2x}{106 - x}$$
- where y is the cost in thousands of dollars of removing x percent of a specific industrial pollutant.
- (a) Find y if $x = 50$
- (b) Find y if $x = 98$
- (c) What percent of the pollutant can be removed for \$22,000?
32. Use matrices and your calculator to solve the following systems;
- (a) $-5x - 3y = 4$
 $2x + y = -3$
- (b) $3x + y - z = 13$
 $x + 2z = 9$
 $-3x - y + 2z = 9$
33. Gretchen Schmidt plans to buy shares of two stocks. One costs \$32 per share and pays dividends of \$1.20 per share. The other costs \$23 per share and pays dividends of \$1.40 per share. She has \$10,100 to spend and wants to earn dividends of \$540. How many shares of each stock should she buy?
34. Joyce Pluth has money in two investment funds. Last year the first fund paid a dividend of 8% and the second dividend of 2% and Joyce received a total of \$780. This year the first fund paid a 10% dividend and the second only 1% and Joyce received \$810. How much does she have invested in each fund?
35. Shirley Cicero has \$16,000 invested in Boeing and GE stock. The Boeing stock currently sells for \$30 per share and the GE stock for \$70 per share. If GE stock triples its value and the Boeing stock goes up 50%, her stock will be worth \$34,5000. How many shares of each stock does she own?

36. Pretzels cost \$3 per pound, dried fruit \$4 per pound and nuts \$8 per pound. how many pounds of each should be used to produce 140 pounds of trail mix costed \$6 per pound in which there are twice as many pretzels (by weight) as dried fruit?

37. You are given \$144 in one, five, and ten dollar bills. There are a total of 35 bills. There are two more ten dollar bills than five dollar bills. How many bills of each type are there?

38. Use matrices and your calculator to solve the following systems of equations:

(a) $4x - y - 2z = 4$
 $x - y - \frac{1}{2}z = 1$
 $2x - y - z = 8$

(b) $x - z = -3$
 $y + z = 6$
 $2x - 3z = -9$

(c) $x - 2y + 3z = 4$
 $2x + y - 4z = 3$
 $-3x + 4y - z = -2$