

Math 1111 Final - Study Guide

Understand standard equations of circles

$$(x - h)^2 + (y - k)^2 = r^2, \text{ where } (h, k) \text{ is the center and } r \text{ is the radius}$$

**Find the center (h, k) and radius r of the circle with the given equation.**

1)  $(x - 2)^2 + (y - 6)^2 = 100$

A)  $(h, k) = (2, 6); r = 10$

B)  $(h, k) = (6, 2); r = 100$

C)  $(h, k) = (6, 2); r = 10$

D)  $(h, k) = (2, 6); r = 100$

Solve linear equations

**Solve the equation.**

2)  $\frac{-5x + 6}{2} + \frac{7}{2} = -\frac{4x}{5}$

A)  $\{\frac{65}{33}\}$

B)  $\{-\frac{5}{17}\}$

C)  $\{\frac{5}{17}\}$

D)  $\{\frac{65}{17}\}$

Find the distance between two points

**Find the distance  $d(P_1, P_2)$  between the points  $P_1$  and  $P_2$ .**

3)  $P_1 = (-6, -3); P_2 = (1, -2)$

A)  $48\sqrt{3}$

B) 48

C)  $5\sqrt{2}$

D) 6

Solve Quadratic Equations by factoring or by using the Quadratic Formula

**Find the real solutions, if any, of the equation. Use the quadratic formula.**

4)  $7x^2 = -8x - 2$

A)  $\{\frac{-8 - \sqrt{2}}{7}, \frac{-8 + \sqrt{2}}{7}\}$

B)  $\{\frac{-4 - \sqrt{2}}{7}, \frac{-4 + \sqrt{2}}{7}\}$

C)  $\{\frac{-4 - \sqrt{30}}{7}, \frac{-4 + \sqrt{30}}{7}\}$

D)  $\{\frac{-4 - \sqrt{2}}{14}, \frac{-4 + \sqrt{2}}{14}\}$

**Solve the equation by factoring.**

5)  $x^2 - 5x - 36 = 0$

A)  $\{-4, -9\}$

B)  $\{4, 9\}$

C)  $\{4, -9\}$

D)  $\{-4, 9\}$



Solve inequalities

**Solve the inequality. Express your answer using interval notation.**

6)  $|4x + 9| + |-5| \leq 10$

A)  $(-\infty, -\frac{7}{2}]$  or  $[-1, \infty)$

B)  $[1, \frac{7}{2}]$

C)  $[-\frac{7}{2}, -1]$

D)  $(-\infty, 1]$  or  $[\frac{7}{2}, \infty)$

7)  $|5x + 2| > 3$

A)  $(-1, \frac{1}{5})$

B)  $(-\infty, -1)$  or  $(\frac{1}{5}, \infty)$

C)  $(-\infty, -1]$  or  $[\frac{1}{5}, \infty)$

D)  $[-1, \frac{1}{5}]$

Understand quadratic functions, find the vertex and max or min value of the function. Solve word problems in which the function is quadratic.

**Find the vertex and axis of symmetry of the graph of the function.**

8)  $f(x) = -x^2 + 12x - 1$

A)  $(12, -1)$ ;  $x = 12$

B)  $(-6, -37)$ ;  $x = -6$

C)  $(-6, -109)$ ;  $x = -6$

D)  $(6, 35)$ ;  $x = 6$

**Solve the problem.**

17) The profit that the vendor makes per day by selling  $x$  pretzels is given by the function

$P(x) = -0.004x^2 + 2.8x - 250$ . Find the number of pretzels that must be sold to maximize profit.

A) 1.4 pretzels

B) 240 pretzels

C) 700 pretzels

D) 350 pretzels

18) The owner of a video store has determined that the profits  $P$  of the store are approximately given by  $P(x) = -x^2 + 150x + 63$ , where  $x$  is the number of videos rented daily. Find the maximum profit to the nearest dollar.

A) \$5688

B) \$11,250

C) \$5625

D) \$11,313

Understand how to calculate  $f + g$ ,  $f - g$ ,  $fg$ , and  $f/g$

**Solve the problem.**

9) Find  $(f - g)(3)$  when  $f(x) = 5x^2 + 2$  and  $g(x) = x + 1$ .

A) 49

B) -50

C) 45

D) 43

10) Find  $(fg)(-2)$  when  $f(x) = x + 1$  and  $g(x) = 2x^2 + 16x - 3$ .

A) 27

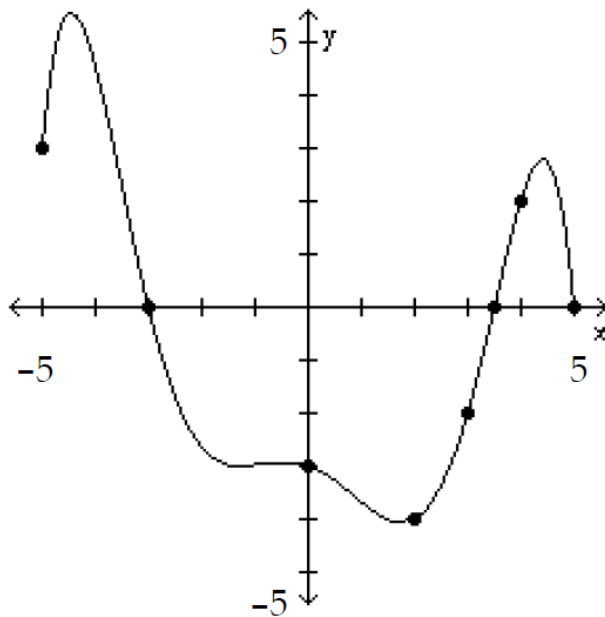
B) -15

C) 31

D) 81

Analyze and interpret graphs of functions

11) How often does the line  $y = -5$  intersect the graph?



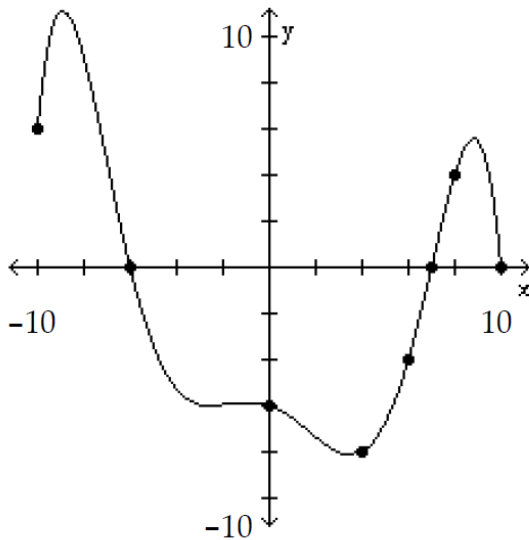
A) once

C) three times

B) twice

D) does not intersect

12) What are the x-intercepts?



A) -6

B) -10, -6, 7, 10

C) -6, 7, 10

D) -6, 7

Write linear equations parallel or perpendicular to a given line containing a given point.

Find an equation for the line with the given properties.

13) Parallel to the line  $2x + 9y = 24$ ; containing the point  $(3, -6)$

A)  $3x + 9y = 24$

B)  $2x + 9y = -48$

C)  $9x + 2y = -6$

D)  $2x - 9y = -48$

**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

14) Parallel to the line  $y = -5x + 10$  that contains the point  $(2, 20)$

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

15) Perpendicular to the line  $y = \frac{1}{9}x + 8$ ; containing the point  $(3, -2)$

A)  $y = -9x + 25$

B)  $y = -9x - 25$

C)  $y = -\frac{1}{9}x - \frac{25}{9}$

D)  $y = 9x - 25$

16) Perpendicular to the line  $-5x - y = 4$ ; containing the point  $(0, -\frac{4}{5})$

A)  $y = \frac{1}{5}x + 4$

B)  $y = -\frac{3}{5}$

C)  $y = -\frac{1}{5}x - \frac{4}{5}$

D)  $y = \frac{1}{5}x - \frac{4}{5}$

Solve logarithmic equations

Solve the equation.

19)  $\log \frac{5+x}{x-3} = \log 5$

- A)  $\left\{ \frac{3}{2} \right\}$                       B)  $\{5\}$                       C)  $\{-5\}$                       D) no solution

**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

20)  $\log_4 (3x + 7) = 4$

Solve compound interest rate problems including ones requiring solution of exponential equations.

Solve the problem.

21) Austin invested \$12,000 in an account at 11% compounded quarterly. Find the amount in Austin's account after a period of 6 years.

- A) \$22,444.97                      B) \$11,011.51                      C) \$23,011.51                      D) \$22,395.63

22) Suppose that \$5000 is invested at an interest rate of 5.6% per year, compounded continuously. What is the balance after 3 years?

- A) \$5280.00                      B) \$6014.68                      C) \$5840.00                      D) \$5914.68

23) Suppose that \$12,000 is invested at an interest rate of 5.2% per year, compounded continuously. What is the doubling time?

- A) 13.3 yr                      B) 2 yr                      C) 12.3 yr                      D) 14.3 yr

Find the inverse of a function

**The function  $f$  is one-to-one. Find its inverse.**

24)  $f(x) = y = -10x + 3$

Solve mixture problems

Solve the problem.

25) A chemist needs 140 milliliters of a 60% solution but has only 49% and 63% solutions available. Find how many milliliters of each that should be mixed to get the desired solution.

- A) 30 mL of 49%; 110 mL of 63%                      B) 100 mL of 49%; 40 mL of 63%  
C) 40 mL of 49%; 100 mL of 63%                      D) 110 mL of 49%; 30 mL of 63%

Solve exponential equation

Solve the equation.

$$26) 2^{(5-3x)} = \frac{1}{16}$$

A)  $\{-3\}$

B)  $\{8\}$

C)  $\{3\}$

D)  $\left\{\frac{1}{8}\right\}$

28) Solve the equation for x

$$y^{x^2} = (y^5)^{125}$$

More Word Problems

27) A basement room is 21 ft by 30 ft. It will have a green section (costing \$10 per square yard) that covers most of the room with a royal blue square section (9 ft by 9 ft costing \$15 per square yard) in the middle.. A 9 ft by 9 ft section of the green carpet must be cut out. The homeowner has found someone to buy this piece for \$3 per square yard. What is the net cost to the homeowner?

Use graphing calculator to solve equations: Manipulate right side to = 0 and then solve for zeros

Use a graphing calculator to solve the equation. Round your answer to two decimal places.

$$29) \ln(2x) = -x + 3$$

A)  $\{0.95\}$

B)  $\{4.75\}$

C)  $\{1.75\}$

D)  $\{3.95\}$

Be able to write exponential expressions as equivalent logarithmic expressions and vice-versa:

Change the exponential expression to an equivalent expression involving a logarithm.

$$30) 4^2 = x$$

A)  $\log_4 2 = x$

B)  $\log_4 x = 2$

C)  $\log_x 4 = 2$

D)  $\log_2 x = 4$

Change the logarithmic expression to an equivalent expression involving an exponent.

$$31) \log_b 125 = 3$$

A)  $125^3 = b$

B)  $125^b = 3$

C)  $3^b = 125$

D)  $b^3 = 125$

- 1) A
- 2) D
- 3) C
- 4) B
- 5) D
- 6) C
- 7) B
- 8) D
- 9) D
- 10) A
- 11) D
- 12) C
- 13) B
- 14)  $y = -5x + 30$
- 15) A
- 16) D
- 17) D
- 18) A
- 19) B
- 20) {83}
- 21) C
- 22) D
- 23) A
- 24)  $f^{-1}(x) = \frac{3 - x}{10}$
- 25) A
- 26) C
- 27) \$808
- 28)  $x = \pm 25$
- 29) C
- 30) B
- 31) D