Hon Pre-Calc

Quiz 1.1 - 1.4 Name _____

Show all work!! Circle all final answers!!!

48/50

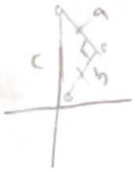
Short Answer

1. Determine the quadrant(s) in which (x,y) is located so that the condition $xy < 0$ is satisfied.

II, IV

2. Using the given points (1,1), (4,5), and (0,8) as vertices of a triangle:

a) Is the triangle acute, right, or obtuse? Verify with work.



distance

$d:(1,1)(4,5) = 5 = a$

$d:(4,5)(0,8) = 5 = b$

$d:(1,1)(0,8) = \sqrt{50} = c$

$a^2+b^2=c^2$ ✓

$\sqrt{25}+\sqrt{25}=\sqrt{50}$

right triangle

b) Is the triangle scalene, isosceles, or equilateral? Verify with work.

$(1,1)(4,5)$ $d:\sqrt{(4-1)^2+(5-1)^2} = \sqrt{9+16} = 5$

$(4,5)(0,8)$ $d:\sqrt{(4)^2+(-3)^2} = \sqrt{16+9} = 5$

$(1,1)(0,8)$ $d:\sqrt{(1)^2+(7)^2} = \sqrt{50}$

isosceles

3. A line segment has (x_1,y_1) as one endpoint and (x_m,y_m) as its midpoint. Find the other endpoint (x_2,y_2) of the line segment in terms of x_1, y_1, x_m and y_m.

$\left(\frac{x_1+x_2}{2}\right) = x_m$

$x_1+x_2 = 2x_m$

$x_2 = 2x_m - x_1$

$(2x_m - x_1, 2y_m - y_1)$

4. Find the x and y intercepts of the graphs of:

a) $y^2 = 6-x$

x-intercepts: (6,0)

$0 = 6-x$ $x = 6$

y-intercepts: $(0,\sqrt{6})(0,-\sqrt{6})$

$y^2 = 6$

b) $y = 1-|x|$

x-intercepts: (1,0)(-1,0)

$0 = 1-|x|$

$-1 = -|x|$

y-intercepts: (0,1)

$y = 1-0$

5. Use the algebra test to describe the symmetry of the following:

a) $y = \frac{x}{x^2+1}$

$y = \frac{-x}{x^2+1}$ $-y = \frac{x}{x^2+1}$ $-y = \frac{-x}{x^2+1}$

origin symmetry

b) $xy^2 + 10 = 0$

$x(y)^2+10$ ✓

$-x(y)^2+10$ ✗

$x(-y)^2+10$ ✗

x-axis symmetry

6. Write the standard for of the equation of a circle with its diameter endpoints at (-4,-1) and (4,1).

$\left(\frac{-4+4}{2}, \frac{-1+1}{2}\right) = (0,0)$

$r = \sqrt{4^2 + 1^2} = \sqrt{17}$

$x^2 + y^2 = 17$

7. Determine whether the lines L_1 and L_2 passing through the pairs of points are parallel, perpendicular, or neither.

a) $L_1: (-2,-1), (1,5)$

$L_2: (1,3), (5,-5)$

$L_1: \frac{5+1}{1+2} = \frac{6}{3} = 2$

$L_2: \frac{3+5}{1-5} = \frac{-8}{4} = -2$

neither

b) $L_1: (4,8), (-4,2)$

$L_2: (3,-5), \left(-1, \frac{1}{3}\right)$

$L_1: \frac{8-2}{4+4} = \frac{6}{8} = \frac{3}{4}$

$L_2: \frac{-5-\frac{1}{3}}{3+1} = \frac{\frac{-16}{3}}{4} = \frac{-16}{12} = \frac{-4}{3}$

perpendicular

8. Given: $5x + 3y = 0$

a) Write the equation in **point slope form** of the line parallel to the given line passing through the point $\left(\frac{7}{8}, -\frac{3}{4}\right)$.

$5x+3y=0$

$3y = -5x$

$y = \frac{-5}{3}x$

$y + \frac{3}{4} = \frac{-5}{3}\left(x - \frac{7}{8}\right)$

b) Write the equation in **point slope form** of the line perpendicular to the given line passing through the point $\left(\frac{7}{8}, -\frac{3}{4}\right)$.

$y + \frac{3}{4} = \frac{3}{5}\left(x - \frac{7}{8}\right)$

9. A sub shop purchases a used pizza oven for $875. After 5 years, the oven will have to be replaced. Write a linear equation in **slope intercept form** giving the value V of the equipment during the 5 years it will be in use.

(0,875)(5,0)

$\frac{-875}{5} = -175$

$V = -175t + 875$

10. Determine whether the equation represents y as a function of x. (Answer function or not a function)

a) $y^2 = x^2 - 1$

not a function

b) $y = [4 - x]$

function

11. Evaluate the function: $f(x) = \begin{cases} 2x+1, x < 0 \\ 2x+2, x \geq 0 \end{cases}$

a) $f(0) = ?$

$2(0)+2$

2

b) $f(-1) = ?$

$2(-1)+1$

$-2+1$

-1

12. Find all real zeros such that $f(x) = 0$

$f(x) = x^3 - x^2 - 4x + 4$

$x^2(x-1) - 4(x-1)$

$(x+2)(x-2)(x-1)$

$x = -2, 2, 1$

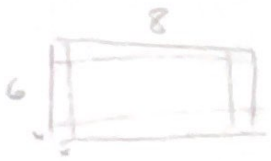
13. State the domain of the function using interval notation.

$f(s) = \frac{\sqrt{x-5}}{x-10}$

$5 \leq x < 10 \quad x > 10$

$[5, 10) \cup (10, \infty)$

14. An open box of maximum volume is to be made from a rectangular piece of material 8 cm in length by 6 cm in width by cutting equal squares from the corners and turning up the sides. See figure.



a) Write a function for the volume of the box in terms of x.

$f(x) = x(6-2x)(8-2x)$

b) Determine the domain of x using **interval notation**.

$(0, 3)$

$-2x = -6$
$x = 3$
$2x = 8$
$x = 4$

c) What is the x value that will yield the maximum volume?

use derivatives

$\frac{7-\sqrt{13}}{3}$

$\frac{9}{8}$ 2 →

$V(x) = x(8-2x)(6-2x)$

$V(x) = 4x^3 - 28x^2 + 48x$

power rule

$V'(x) = 12x^2 - 56x + 48$

$0 = 3x^2 - 14x + 12$

$2(2)(4) = 16$

$\frac{7-\sqrt{13}}{3}$ (doesn't factor)

15. Find the average rate of change function using the difference quotient for the following function:

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

$\frac{(x+h)^3 - 3(x+h)^2 - x^3 + 3x^2}{h}$

$\frac{x^3 + 3x^2h + 3xh^2 + h^3 - 6xh - 3h^2 - x^3 + 3x}{h}$

$\frac{3x^2h + 3xh^2 + h^3 - 6xh - 3h^2}{h}$

$3x^2 + 3xh + h^2 - 6x - 3h$

-2