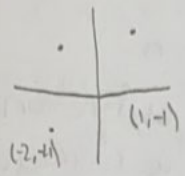
Hon Pre-Calc
Quiz 1.1 - 1.4

Name [redacted] 44/50

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

Short Answer

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



$2 \cdot 4 < 0$ ~~I~~, ~~II~~, ~~III~~, IV

$(-2)4 < 0$

$-8 < 0$

$(-2)(-4) < 0$

$8 > 0$

$1(-1) < 0$

$-1 < 0$ ✓

Quadrant II, IV

2. 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.

$x_m = \frac{x_1+x_2}{2}$ $\cdot 2$

$2x_m = x_1 + x_2$

$-x_1$

$2x_m - x_1 = x_2$

$\left(x_m = \frac{x_1+x_2}{2},\ y_m = \frac{y_1+y_2}{2}\right)$

$2y_m = \frac{y_1+y_2}{2} \cdot 2$

$2y_m = y_1 + y_2$

$-y_1$

$2y_m - y_1 = y_2$

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

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

a) $y^2 = 6 - x$

$(0)^2 = 6 - x$

$0 = 6 - x$

$-6 = -x$

$x = 6$

$y^2 = 6 - 0$

$\sqrt{y^2} = \sqrt{6}$

$y = \pm\sqrt{6}$

$(6,0)$

$(0, \sqrt{6})$

$(0, -\sqrt{6})$

b) $y = 1 - |x|$

$0 = 1 - x$

$-1 = -x$

$x = 1$

$y = 1 - 0$

$y = 1$

$(1,0)$

$(0,1)$

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

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

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

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

No y-axis symmetry

No x-axis symmetry

Symmetry about the origin

b) $xy^2 + 10 = 0$

$-x(-y)^2 + 10 = 0$

$-xy^2 + 10 = 0$

No Symmetry about the origin

$-xy^2 + 10 = 0$

No y-axis symmetry

$x(-y)^2 + 10 = 0$

$xy^2 + 10 = 0$

Symmetric about x-axis

-1

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

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

$m = (0,0)$

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

$r = \sqrt{64+4}$

$r = \sqrt{68}$

$x^2 + y^2 = (\sqrt{68})^2$

$x^2 + y^2 = 68$

-1

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

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

$m = \frac{-5}{3}$ $\perp m = \frac{3}{5}$

$3y = -5x$

$\frac{3}{3}$ $\frac{3}{3}$

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

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

-3

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

a) $L_1: (-2,-1),(1,5)$ $m_{L_1} = \frac{5+1}{1+2} = \frac{6}{3} = 2$

$L_2: (1,3),(5,-5)$ $m_{L_2} = \frac{-5-3}{5-1} = \frac{-8}{4} = -2$

Neither

b) $L_1: (4,8),(-4,2)$ $m_{L_1} = \frac{2-8}{-4-4} = \frac{-6}{-8} = \frac{3}{4}$

$L_2: (3,-5),\left(-1,\frac{1}{3}\right)$ $m_{L_2} = \frac{\frac{1}{3}+5}{-1-3} = \frac{\frac{16}{3}}{-4}$

$= \frac{16}{3} \cdot -\frac{1}{4} = -\frac{16}{12}$

Perpendicular

$m_{L_2} = -\frac{4}{3}$

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

875/5

$= 5\overline{)875}$ (175)

-5

37

-35

25

-25

0

t = number of years in use

V = Value

$V = -175t + 875$

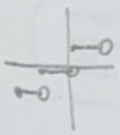
Loses \$175 of value every year

9. Determine whether the equation represents y as a function of x. (**EXPLAIN** why or why not)

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

No this is not a function, both x and y are squared making this a circle which means that it fails vertical line test

b) $y = [4-x]$ ← Step Function



Yes this is a Function because every x value corresponds with one-y value

Each independent variable corresponds with one dependent variable

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

a) $f(0) = ?$

$f(0) = 2(0)+1 = 1, x<0$ ✗

$2(0)+2 = 2, x \geq 0$ ✓

$f(0) = 2$

b) $f(-1) = ?$

$f(-1) = 2(-1)+1 = -1$

$2(-1)+2 = 0$

$f(-1) = -1$

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

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

$0 = x^3 - x^2 - 4x + 4$

$0 = x^2(x-1) - 4(x-1)$

$0 = (x^2-4)(x-1)$

$0 = (x+2)(x-2)(x-1)$

$x+2=0 \quad x-2=0 \quad x-1=0$

$x=-2 \quad x=2 \quad x=1$

$x=-2,\ x=1,\ x=2$

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

$f(s) = \frac{\sqrt{s-1}}{s-4}$ $s \geq 0$, $s \neq 4$

$(0,4) \cup (4,\infty)$

13. Find the average rate of change formula using the difference quotient for:

$f(x) = \frac{7}{x^2}$ $= \frac{f(x+h)-f(x)}{h}$

$= \frac{\frac{7}{(x+h)^2} + \frac{-7}{x^2}}{h} = \frac{7x^2 - 7(x^2+2hx+h^2)}{h(x+h)^2x^2}$

$= \frac{7x^2 - 7x^2 - 14hx - 7h^2}{h(x+h)^2x^2}$

$= \frac{-14x-7h}{(x+h)^2x^2}$

$= \frac{-14x-7h}{(x+h)^2x^2}$

14. Find the average rate of change function using the difference quotient for the following function:
(Rationalize the numerator)

$f(x) = 3\sqrt{x-1}$ $\frac{f(x+h)-f(x)}{h}$

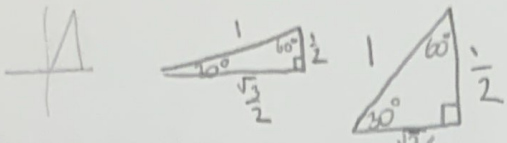
$= \frac{3\sqrt{x+h-1} - 3\sqrt{x-1}}{h} \cdot \frac{3\sqrt{x+h-1} + 3\sqrt{x-1}}{3\sqrt{x+h-1} + 3\sqrt{x-1}}$

$= \frac{9(x+h-1) - 9(x-1)}{h}$

$= \frac{9x+9h-9-9x+9}{h}$

$= \frac{9h}{h}$

$= 9$



15. Find the average rate of change from $x=\frac{\pi}{6}$ to $x=\frac{\pi}{6}+h$ using the difference quotient for the following function:

$f(x)=\sin x$ $\quad \frac{f(x+h)-f(x)}{h}$

$\frac{\pi}{6}=30^\circ$

$\sin 30=\frac{1}{2}$

$$=\frac{f\left(\frac{\pi}{6}+h\right)-f\left(\frac{\pi}{6}\right)}{h}$$

$$=\frac{\sin\left(\frac{\pi}{6}+h\right)-\sin\frac{\pi}{6}}{h}$$

$$=\frac{\sin\frac{\pi}{6}\cos h+\cos\frac{\pi}{6}\sin h-\frac{1}{2}}{h}$$

$$=\boxed{\frac{\frac{1}{2}\cos h+\frac{\sqrt{3}}{2}\sin h-\frac{1}{2}}{h}}$$

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

$f(x)=x^3-1$ $\quad \frac{f(x+h)-f(x)}{h}$

$$\frac{\left((x+h)^3-1\right)-x^3+1}{h}=\frac{\left(x^3+3x^2h+3xh^2+h^3-1\right)-x^3+1}{h}$$

$$=\frac{x^3+3x^2h+3xh^2+h^3-x^3+1}{h}$$

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

$$=\boxed{3x^2+3xh+h^2}$$

$$=(x^2+2hx+h^2)(x+h)$$

$$=x^3+2hx^2+xh^2+hx^2+2h^2x+h^3$$

$$=x^3+3hx^2+3xh^2+h^3$$

$1x^0$

$1x^1y^0+1x^0y^1$

$1x^2y^0+2x^1y^1+1x^0y^2$

$1x^3y^0+3x^2y^1+3x^1y^2+1x^0y^3$

1 4 6 4 1