Hon Pre-Calc Quiz 1.1 - 1.4   2018 - 2019

Show ALL Work!!! Circle ALL final answers!!!

Short Answer

1. Determine the quadrant(s) in which (x, y) is located so that the conditions $x < 0$ and $-y > 0$ is satisfied.

2. Find the coordinates of the point that is exactly $\frac{1}{4}$ of the way from (x_1, y_1) to (x_2, y_2) on the segment joining (x_1, y_1) to (x_2, y_2),

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

   a) $x = y^2 - 5$

   b) $y = x\sqrt{x + 3}$

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

   a) $y = \frac{x^3}{x^2 + 1}$

   b) $xy^2 - 10\sqrt{x} = 0$

5. Write the standard for of the quation of a circle with its diameter endpoints at (-5,-1) and (3,5)

6. Given: $-\frac{2}{3}x - \frac{4}{9}y = 0$

   Write the equation in **point slope form** of the line perpendicular to the given line passing through the point $[\frac{9}{8}, -\frac{3}{4}]$

7. A school district purchases a high-volume printer, copier, and scanner for $25000. After 10 years, the equipment will have to be replaced. Its value at that time is expected to be $2000. What will its value be after 7 years of use assuming the depreciation is linear

8. Find all real value(s) for x for which $f(x) = g(x)$ given:

$f(x) = \sqrt{4x} + 2$
$g(x) = x - 1$

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

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

b) $y = [4 - x]$ or $[4 - x]$

10. Evaluate the function: $f(x) = \begin{cases} 4 - 5x, x \le -2 \\ 0, \ -1 < x \le 2 \\ x^2 + 1, \ x > 2 \end{cases}$

a) $f(-2) =$?

b) $f(2) =$?

11. Write the arc of a circle as a function of its circumference.

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

$$f(x) = \frac{\sqrt{x-1}}{x-4}$$

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

(Rationalize the numerator)

$$f(x) = \frac{4}{\sqrt{x-16}}$$

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

$$f(x) = \frac{5}{2x^2}$$

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

$f(x) = \cos x$

16. Find the average rate of change function on the interval from x to $x+h$ using the difference quotient for the following function.
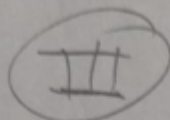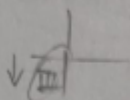
$f(x) = x^3 + 2x^2 - x - 1$

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

Short Answer

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

   $y < 0$

   $\boxed{\text{III}}$ $\underset{\text{III}}{}$

2. Find the coordinates of the point that is exactly $\frac{1}{4}$ of the way from (x_1,y_1) to (x_2,y_2) on the segment joining (x_1,y_1) and (x_2,y_2).

   $\text{midpt}: \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

   (x_1, y_1)

   $\text{coordinate}: \left(\frac{2x_1+x_2}{4}, \frac{2y_1+y_2}{4}\right)$

   $\boxed{\left(\frac{3x_1+x_2}{4}, \frac{3y_1+y_2}{4}\right)}$

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

   a) $x = y^2 - 5$

   $x\text{-int}: x = 0-5 = -5, \boxed{(-5,0)}$

   $y\text{-int}: 0 = y^2-5, y^2=5, |y|=5, y=\pm5$

   $\boxed{(0,5), (0,-5)}$ -1

   $(0, \pm\sqrt{5})$

   b) $y = x\sqrt{x+3}$

   $x\text{-int}: 0 = x\sqrt{x+3}, y=0, x=-3$

   $\boxed{(0,0) (-3,0)}$

   $y\text{-int}: y = 0\sqrt{3} = 0$

   $\boxed{(0,0)}$

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

   $x\text{-axis}: -y = \frac{x^3}{x^4+1}, y = \frac{x^3}{x^4+1}$ ✗

   a) $y = \frac{x^3}{x^2+1}$ $y\text{-axis}: y = \frac{-x^3}{x^4+1}$ ✗

   ✓ origin $-y = \frac{-x^3}{x^4+1}, y = \frac{x^3}{-x-1}$ ✗

   b) $xy^2 - 10\sqrt{x} = 0$

   $x\text{-axis}: x(-y)^2 - 10\sqrt{x} = 0, xy^2 - 10\sqrt{x} = 0$ ✓

   $y\text{-axis}: -xy^2 - 10\sqrt{x} = 0$ ✗

   origin: $-x(-y)^2 - 10\sqrt{x} = 0$ ✗

5. Write the standard for of the equation of a circle with its diameter endpoints at (-5,-1) and (3,5).

   $d = \sqrt{8^2 + 6^2} = \sqrt{64+36} = 10$

   $r = 5$

   $\text{mdpt}: (-1, 2)$

   $\boxed{(x+1)^2 + (y-2)^2 = 25}$

6. Given: $-\frac{2}{3}x - \frac{4}{9}y = 9$ $-6y - 4 = 61$

   $-6y = 6x+81$ $y = -\frac{3}{2}x - \frac{81}{4}$

   Write the equation in **point slope form** of the line perpendicular to the given line passing through the point $\left(\frac{9}{8}, -\frac{3}{4}\right)$.

   $m = \frac{2}{3}$

   $\boxed{\left(y+\frac{3}{4}\right) = \frac{2}{3}\left(x-\frac{9}{8}\right)}$ $\boxed{5}$

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7. A school district purchases a high-volume printer, copier, and scanner for $25000. After 10 years, the equipment will have to be replaced. Its value at that time is expected to be $2000. What will its value be after 7 years of use assuming the depreciation is linear.

$25000 - 10x = 2000$

$10x = 23000$

$x = 2300$

$\dfrac{23(U)}{7}$

16100

$y = 25000 - 2300 (7)$
$ 16100$

$\boxed{y = \$8900}$

8. Find all real value(s) for x for which $f(x) = g(x)$ given:

$f(x) = \sqrt{4x} + 2$

$g(x) = x - 1$

$6 + 2 = 8$
$9 - 1 = 8$

$2\sqrt{x} + 2 = x - 1$

$x - 2\sqrt{x} - 3 = 0$

$(\sqrt{x} - 3)(\sqrt{x} + 1) = 0$

$\sqrt{x} = 3, -1$

$x = 9$ ✗

$\boxed{x = 9}$

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

a) $y^2 = x^2 - 1$ $y = \pm\sqrt{(x+1)(x-1)}$

y is not a function of x because it fails the vertical line test,

ex: $x = 2$ gives $\pm\sqrt{3}$

b) $y = [4-x]$ or $\lfloor 4-x \rfloor$

y is a function of x because it passes the vertical line test. On input gives exactly one output

10. Evaluate the function: $f(x) = \begin{cases} 4 - 5x, & x \le -2 \\ 0, & -2 < x \le 2 \\ x^2 + 1, & x > 2 \end{cases}$

a) $f(-2) = ?$

$4 - 5(-2) = 4 + 10 = 14$

$\boxed{f(-2) = 14}$

b) $f(2) = ?$

$y = 0$

$\boxed{f(2) = 0}$

11. Write the area of a circle as a function of its circumference.

$f(x)$, (c)

$\pi r^2 = 2\pi r$

$\boxed{f(x) = \dfrac{2}{r}}$ 2

$\boxed{A = \dfrac{C^2}{4\pi}}$

$\boxed{.2}$

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

$$f(s) = \frac{\sqrt{s-4}}{s-5}$$

$$s \neq 5, \quad s \geq 4$$

Domain: $[4,5) \cup (5,\infty)$

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

$$f(x) = \frac{5}{2x^2} \qquad \frac{5}{2}x^{-2} \qquad \frac{5}{2}(-2)x^{-3} = -5y^{-3}$$

$$\frac{5}{2} \cdot \frac{-2x}{x^2 \cdot x^2} = -\frac{5}{x^3}$$

$$\frac{f(x+h) - f(v)}{h}$$

$$f(x+h) = \frac{5}{2(x+h)^2}$$

$$f(v) = \frac{5}{2x^2}$$

$$\frac{\dfrac{5}{2(x+h)^2} - \dfrac{5}{2x^2}}{h} = \frac{10x^2 - 10(x+h)^2}{4hx^2(x+h)^2}$$

$$\frac{10}{4} \cdot \frac{(x^2 - (x+h)^2)}{hx^2(x+h)^2} = \frac{5}{2} \cdot \frac{x^2 - x^2 - 2xh - h^2}{hx^2(x+h)^2}$$

$$= \frac{\dfrac{5}{2}(-2x - h)}{x^2(x+h)^2}$$

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

(Rationalize the numerator)

$$f(x) = \frac{4}{\sqrt{x-16}}$$

$$f(x+h) = \frac{4}{\sqrt{(x+h)-16}}$$

$$4 \cdot (x-16)^{-\frac{1}{2}}$$
$$-\frac{1}{2} \cdot 4 (x-16)^{-\frac{3}{2}} = 2(x-16)^{-\frac{3}{2}}$$

$$\frac{-4}{\sqrt{2}(x-16)^{\frac{5}{2}} \cdot (2\sqrt{x-16})}$$

$$\frac{\dfrac{4}{\sqrt{(x+h)-16}} - \dfrac{4}{\sqrt{x-16}}}{h}$$

$$= \frac{4(\sqrt{x-16} - \sqrt{x+h-16})}{h\sqrt{x+h-16} \cdot \sqrt{x-16}} \cdot \frac{\sqrt{x-16} + \sqrt{x+h-16}}{}$$

$$\frac{4((x-16) - (x+h-16))}{h\sqrt{(x+h-16)(x-16)} \cdot (\sqrt{x-16} + \sqrt{x+h-16})}$$

$$= \frac{-4}{\sqrt{(x+h-16)(x-16)} \cdot (\sqrt{x-16} + \sqrt{x+h-16})}$$

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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:

$$f(x) = \cos x$$

$f'(x) = \sin x$

$f'(\frac{\pi}{6}) = -\sin\frac{\pi}{6} = -\frac{1}{2}$ ✓

$$\frac{\cos(\frac{\pi}{6}+h) - \cos\frac{\pi}{6}}{h}$$

$$= \frac{\cos\frac{\pi}{6}\cdot\cos h - \sin\frac{\pi}{6}\cdot\sin h - \cos\frac{\pi}{6}}{h}$$

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

$$= \frac{\frac{\sqrt{3}}{2}(\cos h - 1) - \frac{1}{2}\sin h}{h}$$

$-\frac{\sqrt{3}}{2}\lim_{h\to 0}\frac{1-\cos h}{h} - \frac{1}{2}\lim_{h\to 0}\frac{\sin h}{h}$

$= -\frac{1}{2}$ ✓

$$\frac{\sqrt{3}\cos h - \sin h - \sqrt{3}}{2h}$$

16. Find the average rate of change function on the interval from x to $x+h$ using the difference quotient for the following function:

$3x^2 + 4x - 1$

$$f(x) = x^3 + 2x^2 - x - 1$$

$$\frac{(x+h)^3 + 2(x+h)^2 - (x+h) - 1 - (x^3 - 2x^2 - x - 1)}{h}$$

$$= \frac{x^3 + 3x^2h + 3xh^2 + h^3 + 2x^2 + 4xh + 2h^2 - x - h - 1}{h}$$

$$= 3x^2 + 3yh + h^2 + 4x + 2h - 1$$

$$= 3x^2 + 4x - 1 + 3xh + 2h + h^2$$

-1

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