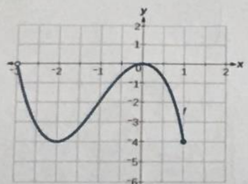
Algebra 2 Trig IB Chapter 1, sections 1-5 Test Review 2017 Name: Key

To earn credit, you must show all work for numbers 7-19 to earn credit. Please make sure the work is neat and organized. Circle all of your final answers. If you have work you want me to see on loose-leaf, please leave me a note near that problem, or I will not refer to your loose-leaf. Fractions may be left improper.

Circle true or false for each. $\frac{-y}{-1} < \frac{0}{-1}$ $y > 0$

1. TRUE / FALSE If $x < 0$ and $-y < 0$ the point (x, y) is in quadrant III.
2. TRUE / FALSE The points $(-8, 4)$, $(2, 11)$ *and* $(-5, 1)$ represent the vertices of an isosceles triangle.
3. TRUE / FALSE In order to divide a line segment into 16 equal parts, you would have to use the midpoint formula 16 times.
4. TRUE / FALSE The slope of the line $x = -3$ is 0, and it has no y-intercept.
5. TRUE / FALSE The line through $(-8, 2)$ *and* $(-1, 4)$ and the line through $(0, -4)$ *and* $(-7, 7)$ are parallel.
6. TRUE / FALSE The function $g(x) = x^3 - x$ is an odd function.
7. TRUE / FALSE The graph below is a function.



8. For the line segment joining the points $\overset{x_1\ y_1}{(-4, 10)}$ *and* $\overset{x_2\ y_2}{(4, -5)}$, find:
(You must show all work)
   a. The distance between the points.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)}$$
$$= \sqrt{(4-(-4))^2 + (-5-10)^2}$$
$$= \sqrt{8^2 + (-15)^2} = \sqrt{289}$$

Taking out $\boxed{17}$

   b. The midpoint of the line segment.

$$\text{mdpt: } \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{-4+4}{2}, \frac{-5+10}{2}\right) = \left(\frac{0}{2}, \frac{5}{2}\right)$$

$\boxed{\text{mdpt:} = (0, 2.5)}$

memorize distance formula

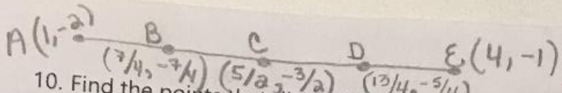
9. Show that the points $(4, 0)$, $(2, 1)$, $(-1, -5)$ for the vertices of a right triangle. *ALGEBRAICALLY*

Distance formula: $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

- Distance b/t $\overset{x_1\ y_1}{(4,0)}$ and $\overset{x_2\ y_2}{(2,1)} = \sqrt{(2-4)^2+(1-0)^2} = \sqrt{(-2)^2+(1)^2} = \sqrt{4+1} = \sqrt{5}$
- Distance b/t $\overset{x_1\ y_1}{(4,0)}$ and $\overset{x_2\ y_2}{(-1,-5)} = \sqrt{(-1-4)^2+(-5-0)^2} = \sqrt{(-5)^2+(-5)^2} = \sqrt{25+25} = \sqrt{50}$
- Distance b/t $\overset{x_1\ y_1}{(2,1)}$ and $\overset{x_2\ y_2}{(-1,-5)} = \sqrt{(-1-2)^2+(-5-1)^2} = \sqrt{(-3)^2+(-6)^2} = \sqrt{9+36} = \sqrt{45}$

g into pythagorean theorem, assuming side $c = \sqrt{50}$ because is the hypotenuse + longest leg $\rightarrow a^2 + b^2 = c^2 \rightarrow (\sqrt{5})^2 + (\sqrt{45})^2 = (\sqrt{50})^2$

$5 + 45 = 50 \quad 50 = 50$ ✓



*drawing a diagram helps

10. Find the points that divide the line segment joining the points $(1,-2)$, $(4,-1)$ into 4 equal parts. Show all work.

A E

Algebraically

① Midpoint b/t $(1,-2)$ and $(4,-1)$ *memorize midpoint formula

$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{1+4}{2}, \frac{-2+(-1)}{2}\right) = \boxed{\left(\frac{5}{2}, \frac{-3}{2}\right)} \leftarrow \text{pt C}$$

② Mdpt b/t $(1,-2)$ and $(5/2, -3/2)$

$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{1+\frac{5}{2}}{2}, \frac{-2+\frac{-3}{2}}{2}\right) = \left(\frac{\frac{2}{2}+\frac{5}{2}}{2}, \frac{\frac{-4}{2}+\frac{-3}{2}}{2}\right)$$

$$\left(\frac{\frac{7}{2}}{2}, \frac{\frac{-7}{2}}{2}\right) = \left(\frac{7}{2}\div\frac{2}{1}, \frac{-7}{2}\div\frac{2}{1}\right) = \left(\frac{7}{2}\cdot\frac{1}{2}, \frac{-7}{2}\cdot\frac{1}{2}\right) = \boxed{\left(\frac{7}{4}, \frac{-7}{4}\right)} \leftarrow B$$

③ mdpt b/t $\left(\frac{5}{2}, \frac{-3}{2}\right)$ and $(4,-1)$

$$\left(\frac{\frac{5}{2}+4}{2}, \frac{\frac{-3}{2}+(-1)}{2}\right) = \left(\frac{\frac{5}{2}+\frac{8}{2}}{2}, \frac{\frac{-3}{2}+\frac{-2}{2}}{2}\right) = \left(\frac{\frac{13}{2}}{2}, \frac{\frac{-5}{2}}{2}\right) = \left(\frac{13}{2}\div\frac{2}{1}, \frac{-5}{2}\div\frac{2}{1}\right) = \left(\frac{13}{2}\cdot\frac{1}{2}, \frac{-5}{2}\cdot\frac{1}{2}\right)$$

$$D \rightarrow \boxed{\left(\frac{13}{4}, \frac{-5}{4}\right)}$$

*Algebraically

11. Find the x and y intercepts of the graph of each equation.

a. $y^2 = 6 - x$

xint:
$y=0$
$0=6-x$
$x=6$
$\boxed{\text{xint: } (6,0)}$

yint:
$x=0$
$y^2=6-0$
$y^2=6$
$y=\pm\sqrt{6}$
yints:
$\boxed{(0,\sqrt{6}),(0,-\sqrt{6})}$

WILL ONLY HAVE ONE OF THESE

b. $y = -|3x-7|$

x-int:
$y=0$
$\frac{0}{-1}=\frac{-|3x-7|}{-1}$
$0=|3x-7|$
$3x-7=0$
$x=7/3$
$\boxed{\text{xint: } (7/3, 0)}$

yint:
$x=0$
$y=-|3(0)-7|$
$y=-|-7|$
$y=-|7|$
$y=-7$
$\boxed{\text{yint: } (0,-7)}$

12. Write the standard form of the equation of the circle whose center is $(-7,-4)$ and whose radius is 7.

$$(x-h)^2+(y-k)^2=r^2$$

$$(x-(-7))^2+(y-(-4))^2=7^2$$

$$\boxed{(x+7)^2+(y+4)^2=7^2}$$

$r=7$
$h=-7$
$k=-4$

*memorize standard form of circle equation

NEED m and b

13. Find the slope-intercept form of the equation of the line that passes through the points $(5,-1)$, $(-5,5)$ $x_1\ y_1\ x_2\ y_2$

① find m

$$m = \frac{y_2-y_1}{x_2-x_1} = \frac{5-(-1)}{-5-5} = \frac{6}{-10} = -\frac{3}{5}$$

* memorize slope formula

METHOD #1:

② Find b

$y = mx+b$

$-1 = \frac{-3}{5}(5)+b$

$-1 = -\frac{15}{5}+b$

$-1 = -3+b \Rightarrow b=2$

③ write equation $\boxed{y=-3/5x+2}$

METHOD #2

② plug into $y-y_1=m(x-x_1)$

$y-(-1)=\frac{-3}{5}(x-5)$

$y+1 = \frac{-3}{5}x+\frac{15}{5}$

$y+1 = -3/5x+3$

$\boxed{y=-\frac{3}{5}x+2}$

14. Given $f(x) = 3-\sqrt{x}$ find the following:

a. $f(4) = 3-\sqrt{4} = 3-2 = \boxed{1}$

b. $f(\frac{1}{4}) = 3-\sqrt{1/4}$

$= 3-\frac{\sqrt{1}}{\sqrt{4}}$

$= 3-\frac{1}{2} = \boxed{2\frac{1}{2}}$

taking OUT

c. $f(4x^7)$

$= 3-\sqrt{4x^7} = 3-2\sqrt{x^2\cdot x^2\cdot x^2\cdot x} = \boxed{3-2x^3\sqrt{x}}$

15. Given: $\begin{cases} 3x-1, & x<-1 \\ 4, & -1\le x\le 1 \\ x^2, & x>1 \end{cases}$ Find the following:

a. $f(-2)$

$3x-1$

$3(-2)-1 = -6-1 = \boxed{-7}$

b. $f(-\frac{1}{2})$

$\boxed{4}$

c. $f(3)$

x^2

$(3)^2 = \boxed{9}$

16. Find the difference quotient of $f(x) = x^3 + 3x$ $\quad h \neq 0$ $\quad$ Simplify your answer.

$$\frac{f(x+h)-f(x)}{h} \rightarrow \frac{\cancel{x^3}+h^3+3x^2h+3xh^2+\cancel{3x}+3h\underbrace{-\cancel{x^3}-\cancel{3x}}_{-(x^3+3x)}}{h}$$

*memorize diff. quotient

$f(x+h) = (x+h)^3 + 3(x+h)$

$(x+h)(x+h)(x+h)+3x+3h$

$(x+h)(x^2+2xh+h^2)+3x+3h$

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

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

17. Find the zeros of the function algebraically $f(x) = \frac{2x^2-9}{3-x}$ All work must be shown to receive credit.

$2x^2-9=0$

$2x^2=9$

$x^2 = \frac{9}{2}$

$x = \pm\sqrt{\frac{9}{2}}$

$\rightarrow x = \pm\frac{\sqrt{9}}{\sqrt{2}}$

$= \pm\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \boxed{\pm\frac{3\sqrt{2}}{2}}$

18. Find the average rate of change of the function from $x_1 = 0$ *to* $x_2 = 3$ for the function $f(x) = -2x + 15$

$$\frac{f(x_2)-f(x_1)}{x_2-x_1}$$

$x_1 = 0$ $\quad f(x_1) = 15$

$x_2 = 3$ $\quad f(x_2) = 9$

$f(x_1) = f(0) = -2(0)+15 = 0+15 = 15$

$f(x_2) = f(3) = -2(3)+15 = -6+15 = 9$

$$\frac{9-15}{3-0} = \frac{-6}{3} = \boxed{-2}$$

*memorize average rate of change formula

19. Determine whether the function $h(x) = x^6 - 2x^2 + 3$ is even, odd, or neither.

EVEN?

$h(-x) = h(x)$

$h(-x) = (-x)^6 - 2(-x)^2 + 3$

$= x^6 - 2x^2 + 3$

$\boxed{\text{EVEN}}$

*memorize even/odd definitions