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part I: Write True if the statement is correct and False otherwise on the space provided. (2 pts each)

False 1. The distance between (a, b) and (a, b) is $\sqrt{2a + 2b}$. ×

True 2. If l_1 is parallel to $x-axis$ and l_2 is parallel to $y-axis$, then the lines are perpendicular.

True 3. Let R be a relation.on the set $A = \{1, 3, 5\}$ defined by $R = \{(a, b) \in A \times A : a + b < 7\}$. Then $R = R^{-1}$.

True 4. The polynomial function $p(x) = (x^2 - 2x)^2$ has at most four roots.

True 5. The focal length of parabola $y^2 - 2y + 4x + 9 = 0$ is -1.

False 6. If the slope of line is undefined, then the line is horizontal.

part II: Write the most simplified answer on the space provided. (2 pts each)

1. The domain of $g(x) = \log_3 2x - 3$ is $x > 3/2$ or $(3/2, \infty)$
2. Let $M(2, -3)$ be the mid point of line segment PQ. If P is $(-5, -7)$, then $Q =$ $(9, 1)$.
3. Given $\tan\theta = \frac{3}{4}$ and $\sin\theta > 0$. Then $\cos\theta =$ $4/5$.
4. Suppose that $f(x) = 3^x$. Then $\frac{f(x+2)-f(x)}{2} =$ $4(3^x)$.
5. The exact numerical value of $\tanh(\ln 2) =$ $3/5$.
6. If $h(x) = fog(x)$ and $h(x) = (x+2)^3$, then $f(x) =$ x^3 and $g(x) =$ $x+2$.
7. For a relation R on set $A = \{0, 1, 2, 3, 4, 5\}$ defined by $R = \{(a, b) : 3 \text{ divides } a + b\}$
   $Dom(R) =$ $(0,1,2,3,4,5)$ and $Range(R) =$ $(0,1,2,3,4,5)$
8. Let $f(x) = x^2 + 2x$ and $g(x) = \frac{5}{x+2}$. Then $gof(2) =$ $1/2$.
9. If $(32)^{3a-1} = \frac{1}{2}$, then $a =$ $4/15$.

18

20

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

$(2x)^{5(3a-1)} = 2^{-1}$

$5(3a-1) = -1$

$15a - 5 = -1$

$15a = 4$

$a = 4/15$

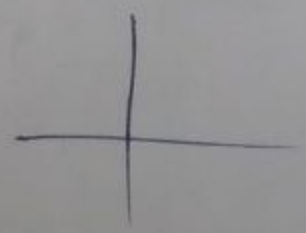
$3a - 1 = -1/5$

$3a = 4/15$

$-\frac{1}{5} + 1 = -\frac{1}{5} + \frac{5}{5} = \frac{4}{5}$

$(a,b)(a,b)$

$\sqrt{(a-a)^2 + (b-b)^2} =$



$f(14/15)$ $g(14/5 - 1)$ $14 - 5 = 9$

$2(14/15) - 1$ $3(4/5 - 1)$ $4 - 5 = -1$

because

part III: Show all the necessary steps clearly and neatly on space provided.

1. Let $f(x) = \frac{3x+1}{2-x}$. Then (4 pts)

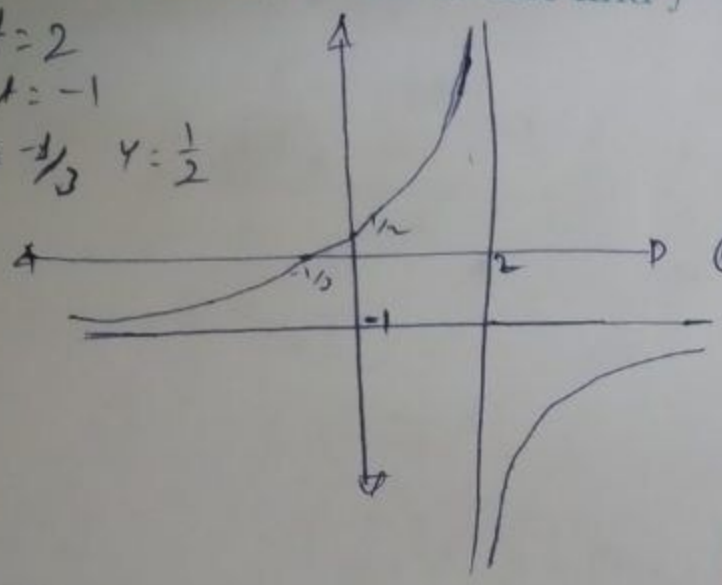
   a. Check whether f is one to one or not.

   b. If f is one to one find $f^{-1}(x)$.

V.A: $x = 2$

H.A: $y = -1$

$x = -\frac{1}{3}$ $y = \frac{1}{2}$



it is one to one due to horizontal line test

	$-\frac{1}{3}$		2	
$3x+1$	−	+		+
$2-x$	+	+		−
$f(x)$	−	+		−

(a) it is one to one because of the horizontal line test intersect only one time.

4

(b) $\frac{3x+1}{2-x} = y$ interchange $x = \frac{3y+1}{2-y}$

$\frac{x}{1} \times \frac{3y+1}{2-y}$

$3y+1 = 2x - yx$

$3y + yx = 2x - 1$

$\frac{y(3+x)}{3+x} = \frac{2x-1}{3+x}$

$y = \frac{2x-1}{x+3}$

2. If $2i$ is root of $p(x) = x^3 + 2x^2 + 4x + 8$, then find the remaining roots of $p(x)$. (5 pts)

$(x-2i)(x+2i) = x^2 + 2xi - 2xi - 4i^2 = \underline{x^2+4}$

$$
\begin{array}{r|l}
 & x+2 \\
\hline
x^2+4 & x^3+2x^2+4x+8 \\
-(x^3+4x) & \\
\hline
 & 2x^2+8 \\
 & -(2x^2+8) \\
\hline
 & 0
\end{array}
$$

$P(x) = (x^2+4)(x+2) = 0$

$2i, -2i, -2$ are roots of $P(x)$.

$P(-2) = (-2)^3 + 2(-2)^2 + 4(-2) + 8$ (5)

$P(-2) = -8 + 4 - 4 + 8$

$P(-2) = 0$ its true.

$-8 + 4 - 4 + 8$

3. Let $f(x) = \frac{3x+4}{x^2-9}$. Then find (6 pts)

a. x intercept and y intercept of $f(x)$.

b. All asymptotes of $f(x)$

c. Sketch the graph of $f(x)$

(A) $y = \frac{3x+4}{x^2-9} \Rightarrow 0 = \frac{3x+4}{x^2-9} \Rightarrow 3x+4 = 0 \Rightarrow \frac{3x}{3} = \frac{-4}{3} \Rightarrow x = -4/3$

$y = \frac{3(0)+4}{(0)^2-9} = 4/-9 \Rightarrow y = -4/9.$

$x = (-4/3, 0) \quad y = (0, -4/9)$

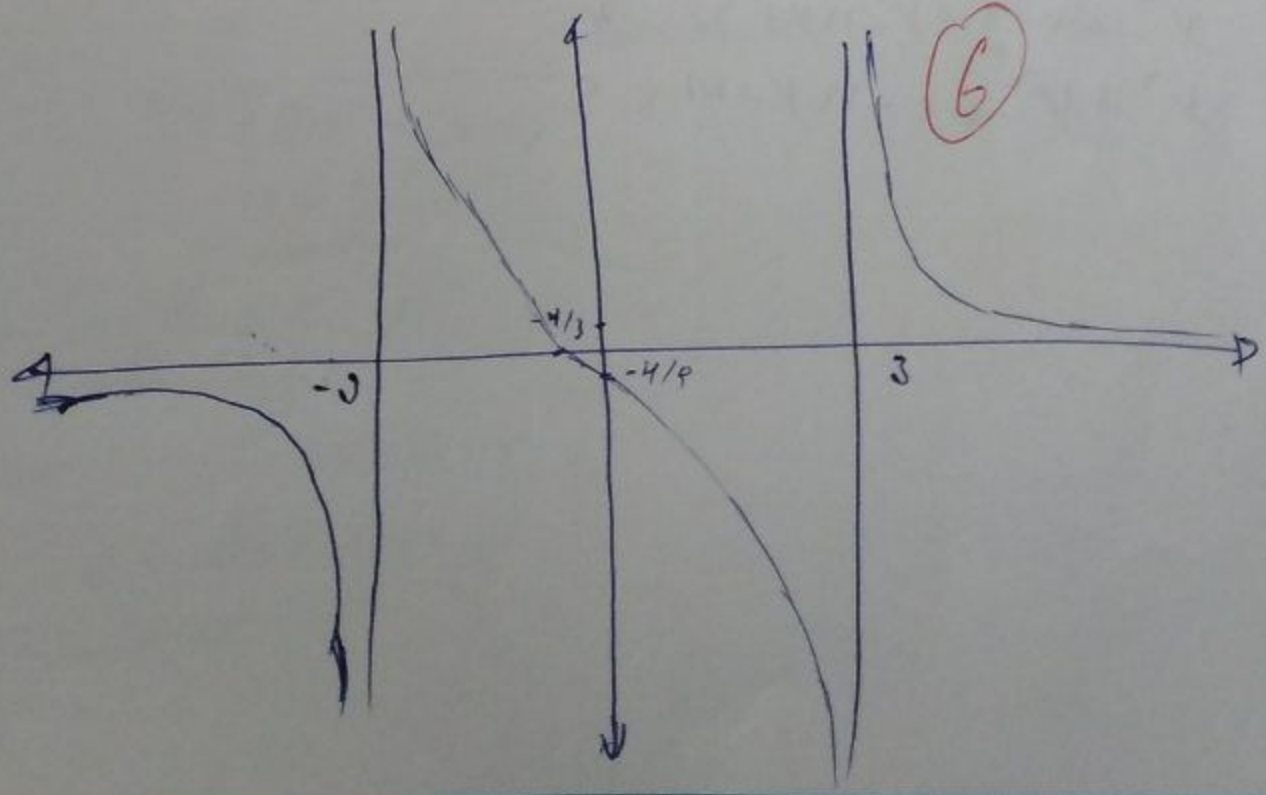
(B) $V.A = x^2 - 9 \neq 0 \quad x^2 = 9 \Rightarrow x = \pm 3$

$V.A = 3$ and -3 or $x = \pm 3$

$H.A = 0$ or $y = 0$ when denominator power is greater than numerator.

(C)

	-3		-4/3		3	
$3x+4$	−	∄	−	0	+	+
$x+3$	−	∄	+	+	+	+
$x-3$	−		−		∄	+
$f(x)$	−	∄	+	0	∄	+



(6)

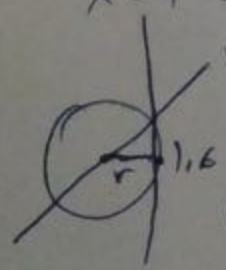
4. The center of circle is on the line $y = 2x$ and the line $x = 1$ is tangent to circle at $(1, 6)$. Then (5 pts)

a. Find the center of circle

b. Find radius of circle

c. Find the general equation of circle.

$X = 1$



$C(h, 2h)$

$k = 2h$

$r = \sqrt{(x-h)^2 + (y-k)^2}$

$r = \sqrt{(1-h)^2 + (6-2h)^2}$

$r = h - 1$

$(h-1)^2 = \left(\sqrt{(1-h)^2 + (6-2h)^2}\right)^2$

$(h-1)^2 = (1-h)^2 + (6-2h)^2$

$(6-2h)^2 = 36 - 24h + 4h^2$

$= 9 - 6h + h^2$

$h^2 - 2h + 1 = h^2 - 2h + 1 + h^2 - 6h + 9$

$h^2 - 6h + 9 = 0$

$(h-3)^2 = 0$

$h = 3,$

$k = 2h \Rightarrow k = 2(3) = 6$

$k = 6 \Rightarrow C = (3, 6)$

$r = \frac{|Ah + Bk + c|}{\sqrt{A^2 + B^2}}$

$X - 1 = 0$

$A = 1$

$B = 0$

$C = -1$

$\frac{|1(h) + 0(2h) - 1|}{\sqrt{(1)^2 + (0)^2}}$

$\frac{|h-1|}{1} = h - 1$

$r = h - 1$

A

B

$r = \sqrt{(1-3)^2 + (6-6)^2} = 2$

$r = 2$

5

C $(x-3)^2 + (y-6)^2 = 4$

$x^2 - 6x + 9 + y^2 - 12y + 36 = 4$

$x^2 + y^2 - 6x - 12y + 41 = 0$