MATH 12 HOMEWORK SOLUTIONS

1.6 - 44 $m = \dfrac{(3+h)^2-9}{(3+h)-3} = \dfrac{(\cancel{9}+6h+h^2)-\cancel{9}}{h} = \dfrac{6h+h^2}{h} = \dfrac{\cancel{h}(6+h)}{\cancel{h}} = \boxed{6+h}$

46 $m = \dfrac{\frac{1}{x}-\frac{1}{a}}{x-a} \cdot \dfrac{ax}{ax} = \dfrac{a-x}{(x-a)(ax)} = \dfrac{-\cancel{(x-a)}}{\cancel{(x-a)}(ax)} = \boxed{-\dfrac{1}{ax}}$

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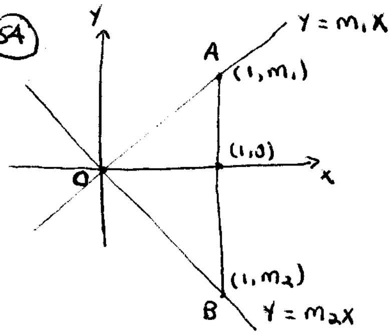


a) A HAS X-COORD. 1, SO ITS Y-COORD. IS $m_1(1) = m_1$
B HAS X-COORD. 1, SO ITS Y-COORD. IS $m_2(1) = m_2$

b) BY THE DISTANCE FORMULA,

$\underline{OA^2} = \left(\sqrt{(1-0)^2+(m_1-0)^2}\right)^2 = (1-0)^2+(m_1-0)^2 = \underline{1+m_1^2}$

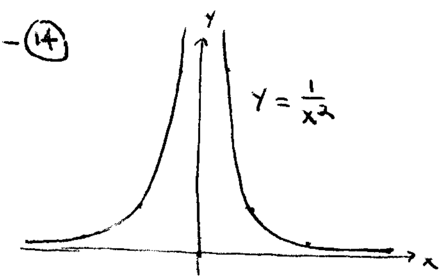
$\underline{OB^2} = \left(\sqrt{(1-0)^2+(m_2-0)^2}\right)^2 = (1-0)^2+(m_2-0)^2 = \underline{1+m_2^2}$

$\underline{AB^2} = \left(\sqrt{(1-1)^2+(m_2-m_1)^2}\right)^2 = 0^2+(m_2-m_1)^2$

$= \underline{m_2^2-2m_1m_2+m_1^2}$

c) THE 2 LINES ARE PERPENDICULAR IFF ΔAOB IS A RIGHT TRIANGLE IFF
$\underline{OA^2+OB^2=AB^2}$ (BY THE PYTHAGOREAN TH. AND ITS CONVERSE) IFF
$(1+\cancel{m_1^2})+(1+\cancel{m_2^2}) = \cancel{m_2^2}-2m_1m_2+\cancel{m_1^2}$ IFF $2=-2m_1m_2$ IFF $\underline{m_1m_2=-1}$.

1.7 - 14



$\underline{\text{X-INT.}}$: NONE ($Y=0$ GIVES $\frac{1}{X^2}=0$ ← NO SOLUTION)

$\underline{\text{Y-INT.}}$: NONE (0 IS NOT IN THE DOMAIN)

GRAPH IS $\underline{\text{SYMMETRIC AROUND THE Y-AXIS}}$, SINCE REPLACING X BY −X GIVES

$Y = \dfrac{1}{(-X)^2} = \dfrac{1}{X^2}$

2.2 - 64 $x-\sqrt{x}=20$ $\quad x-\sqrt{x}-20=0$ $\quad (\sqrt{x})^2-\sqrt{x}-20=0$

$(\sqrt{x}-5)(\sqrt{x}+4)=0$ $\quad \sqrt{x}=5$ OR $\cancel{\sqrt{x}=-4}$ ← (IMPOSSIBLE, SINCE $\sqrt{x}\geq 0$)

$\boxed{x=25}$

$\boxed{\text{OR}}$ $x-\sqrt{x}=20$ $\quad x-20=\sqrt{x}$ $\quad (x-20)^2=(\sqrt{x})^2$ $\quad x^2-40x+400=x$

$x^2-41x+400=0$ $\quad (x-25)(x-16)=0$ $\quad \boxed{x=25}$ OR $\cancel{x=16}$ ← (DOESN'T CHECK, SINCE $16-4=12$)

APP. B.4 - 64 $(x^2+1)^{-2/3}+(x^2+1)^{-5/3} = (x^2+1)^{-5/3}\left[(x^2+1)^{-\frac{2}{3}-(-\frac{5}{3})}+1\right]$

$= (x^2+1)^{-5/3}\left[(x^2+1)^1+1\right] = (x^2+1)^{-5/3}\left[x^2+2\right] = \boxed{\dfrac{x^2+2}{(x^2+1)^{5/3}}}$

2.3 - 22b $|3x+5|<17$ IFF $-17<3x+5<17$

IFF $-22<3x<12$

IFF $-\frac{22}{3}<x<4$

SOLUTION: $\boxed{\left(-\frac{22}{3}, 4\right)}$