Section 1.6

2) a.) $m = \frac{0-9}{-3-4} = \frac{-9}{-7} = \frac{9}{7}$

b.) $m = \frac{2-0}{-1-3} = \frac{2}{-4} = \frac{-1}{2}$

c.) $m = \frac{-\frac{3}{5} - \frac{3}{4}}{\frac{1}{2} - \frac{3}{2}} = \frac{-\frac{12}{20} - \frac{15}{20}}{-\frac{2}{2}} = \frac{-\frac{27}{20}}{-1} = \frac{27}{20}$

d.) $m = \frac{\frac{17}{3} - \left(\frac{-1}{2}\right)}{\frac{-1}{2} - \frac{17}{3}} = \frac{\frac{34}{6} + \frac{3}{6}}{\frac{-3}{6} - \frac{34}{6}} = \frac{\frac{37}{6}}{\frac{-37}{6}} = -1$

4) a.) $m = \frac{0-(-2)}{2-3} = \frac{2}{-1} = -2$

b.) $m = \frac{6-0}{-1-2} = \frac{6}{-3} = -2$

c.) $m = \frac{6-(-2)}{-1-3} = \frac{8}{-4} = -2$

12) a.) m_3, m_2, m_1

b.) b_1, b_2, b_3

13) $m_1 = \frac{-2-\frac{1}{2}}{-8-2} = \frac{-\frac{5}{2}}{\frac{-10}{1}} = -\frac{5}{2} \cdot \frac{-1}{10} = \frac{5}{20} = \frac{1}{4}$,

$m_2 = \frac{\frac{1}{2}-(-1)}{2-11} = \frac{\frac{3}{2}}{\frac{-9}{1}} = \frac{3}{2} \cdot \frac{-1}{9} = \frac{-3}{18} = \frac{-1}{6}$ so points are <u>not</u> collinear since $m_1 \neq m_2$

15) a.) $y-(1) = -5(x-(-2)) \rightarrow y-1 = -5(x+2) \rightarrow y-1 = -5x-10 \rightarrow y = -5x-10+1 \rightarrow y = -5x-9$

b.) $y-\left(\frac{-2}{3}\right) = \frac{1}{3}(x-(-6)) \rightarrow y+\frac{2}{3} = \frac{1}{3}(x+6) \rightarrow y+\frac{2}{3} = \frac{1}{3}x+\frac{6}{3} \rightarrow y = \frac{1}{3}x+\frac{6}{3}-\frac{2}{3} \rightarrow y = \frac{1}{3}x+\frac{4}{3}$

18) a.) $m = \frac{9-9}{7-(-11)} = \frac{0}{18} = 0$ then

$y - y_1 = m(x - x_1) \rightarrow y - 9 = 0(x-7) \rightarrow y - 9 = 0 \rightarrow y = 9$

b.) $m = \frac{2-3}{\frac{5}{4}-\frac{3}{4}} = \frac{-1}{\frac{2}{4}} = \frac{-1}{\frac{1}{2}} = -2$ then

$y - y_1 = m(x - x_1) \rightarrow y - 2 = -2(x - \frac{5}{4}) \rightarrow$

$y - 2 = -2x + \frac{10}{4} \rightarrow y = -2x + \frac{5}{2} + \frac{4}{2} \rightarrow y = -2x + \frac{9}{2}$

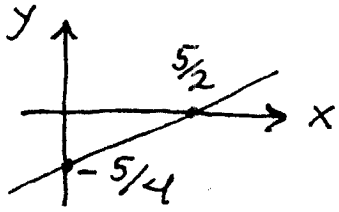
19) $x = -3$

20) $y = 8$

22) $y = 0$ is the x-axis

23) b.) $y = mx + b \rightarrow y = 2x + \frac{3}{2}$

25) b.)



$y - 0 = \frac{1}{2}(x - \frac{5}{2}) \rightarrow$

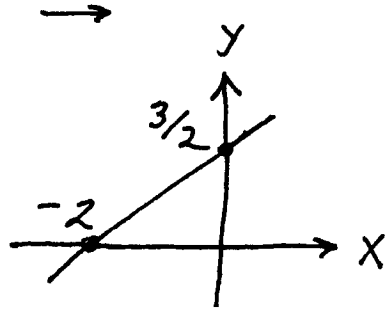
$y = \frac{1}{2}x - \frac{5}{4}$.

d.) x-intercept -2 so passes through point $(-2, 0)$ with slope $3/4 \rightarrow$

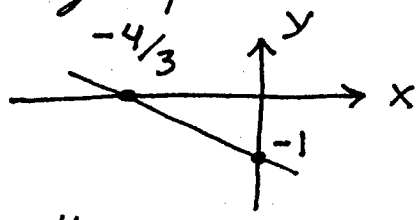
$y - 0 = \frac{3}{4}(x - (-2)) \rightarrow$

$y = \frac{3}{4}(x + 2) \rightarrow$

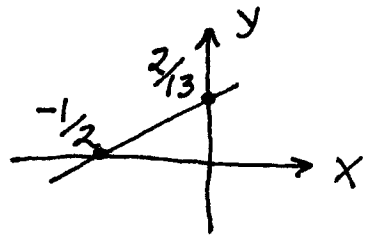
$y = \frac{3}{4}x + \frac{6}{4} \rightarrow y = \frac{3}{4}x + \frac{3}{2}$



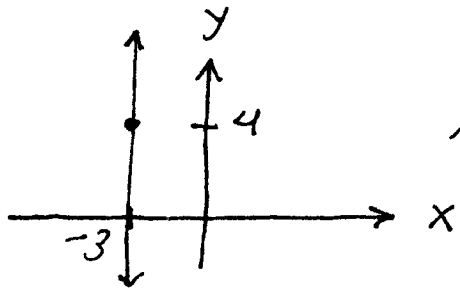
26) c.) $3x+4y=12 \rightarrow 4y=-3x+12 \rightarrow y=\frac{-3}{4}x+3$
$\rightarrow$ slope $m=\frac{-3}{4}$ and passes through point
$(0,-1) \rightarrow y-(-1)=\frac{-3}{4}(x-0)$
$\rightarrow y+1=\frac{-3}{4}x$
$\rightarrow y=\frac{-3}{4}x-1$;
if $y=0$: $0=\frac{-3}{4}x-1 \rightarrow 1=\frac{-3}{4}x \rightarrow x=\frac{-4}{3}$



d.) $-2x+y=1$ and $y=0 \rightarrow -2x+0=1 \rightarrow -1=2x$
$\rightarrow x=\frac{-1}{2}$ is x-intercept (point $(\frac{-1}{2},0)$)
and also passes through point $(6,2) \rightarrow$
slope $m=\frac{2-0}{6-(\frac{-1}{2})}=\frac{2}{\frac{12}{2}+\frac{1}{2}}=\frac{2}{\frac{13}{2}}=\frac{2}{1}\cdot\frac{2}{13}=\frac{4}{13} \rightarrow$
$y-2=\frac{4}{13}(x-6) \rightarrow$
$y-2=\frac{4}{13}x-\frac{24}{13} \rightarrow$
$y=\frac{4}{13}x-\frac{24}{13}+\frac{26}{13} \rightarrow y=\frac{4}{13}x+\frac{2}{13}$

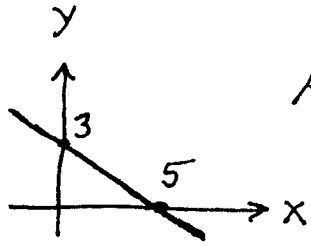


28)



line : $x=-3$

29) b.) $3x+5y=15$
$x=0$: $y=3$
$y=0$: $x=5$



Area $=\frac{1}{2}(5)(3)$
$=\frac{15}{2}$

31) a.) $3X-4Y=12 \rightarrow -4Y=-3X+12 \rightarrow$
$y=\frac{3}{4}x-3 \rightarrow$ slope $m=3/4$;
$4X-3Y=12 \rightarrow -3y=-4x+12 \rightarrow$
$y=\frac{4}{3}x-4 \rightarrow$ slope $m=4/3$; neither

b.) $y=5x-16 \rightarrow$ slope $m=5$; $y=5x+2 \rightarrow$ slope $m=5$; parallel

c.) $5x-6y=25 \rightarrow -6y=-5x+25 \rightarrow$
$y=\frac{5}{6}x-\frac{25}{6} \rightarrow$ slope $m=5/6$; $6x+5y=0 \rightarrow$
$5y=-6x \rightarrow y=\frac{-6}{5}x \rightarrow$ slope $m=-6/5$; perpendicular

34) $4x+5y=20 \rightarrow 5y=-4x+20 \rightarrow$
$y=\frac{-4}{5}x+4 \rightarrow$ slope $m=-4/5$ and passes through point $(0,0) \rightarrow y-0=\frac{-4}{5}(x-0) \rightarrow$
$y=\frac{-4}{5}x$ or $5y=-4x \rightarrow 4x+5y=0$.

35) $4y-3x=1 \rightarrow 4y=3x+1 \rightarrow y=\frac{3}{4}x+\frac{1}{4}$
$\rightarrow$ slope is $\frac{3}{4}$ so perpendicular slope is $m=\frac{-4}{3}$ and passes through point $(4,0)$
$\rightarrow y-0=\frac{-4}{3}(x-4) \rightarrow y=\frac{-4}{3}x+\frac{16}{3}$ or
$y+\frac{4}{3}x-\frac{16}{3}=0 \rightarrow 3y+4x-16=0$.

44) $\text{slope}=\frac{(3+h)^2-9}{(3+h)-3}=\frac{9+6h+h^2-9}{h}$

$$= \frac{h(6+h)}{h} = 6+h$$

42) a.) $y = 240 - 20$ (# trees above 100)

$= 240 - 20(x-100)$

$= 240 - 20x + 2000$

$= 2240 - 20x$

b.) If $y = 400$ then $400 = 2240 - 20x \rightarrow$

$20x = 1840 \rightarrow x = 92$ trees

c.) If $x = 95$ then $y = 2240 - 20(95)$

$= 2240 - 1900 = 340$ oranges

Worksheet 2

1) $\text{slope} = \dfrac{(x+h)^3 - x^3}{(x+h) - x} = \dfrac{\cancel{x^3} + 3x^2h + 3xh^2 + h^3 - \cancel{x^3}}{h}$

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

2) $\text{slope} = \dfrac{\sqrt{x+h} - \sqrt{x}}{(x+h) - x}$ (multiply by conjugate)

$= \dfrac{\sqrt{x+h} - \sqrt{x}}{h} \cdot \dfrac{\sqrt{x+h} + \sqrt{x}}{\sqrt{x+h} + \sqrt{x}} = \dfrac{(\sqrt{x+h})^2 - (\sqrt{x})^2}{h(\sqrt{x+h} + \sqrt{x})}$

$= \dfrac{\cancel{x} + h - \cancel{x}}{h(\sqrt{x+h} + \sqrt{x})} = \dfrac{\cancel{h}}{\cancel{h}(\sqrt{x+h} + \sqrt{x})} = \dfrac{1}{\sqrt{x+h} + \sqrt{x}}$

3) $\text{slope} = \dfrac{\frac{1}{x+h} - \frac{1}{x}}{(x+h) - x} = \dfrac{\frac{x}{x(x+h)} - \frac{x+h}{x(x+h)}}{\frac{h}{1}}$

$= \dfrac{x - (x+h)}{x(x+h)} \cdot \dfrac{1}{h}$

$= \dfrac{\cancel{x} - \cancel{x} - h}{x(x+h)h} = \dfrac{-\cancel{h}}{x(x+h)\cancel{h}} = \dfrac{-1}{x(x+h)}$