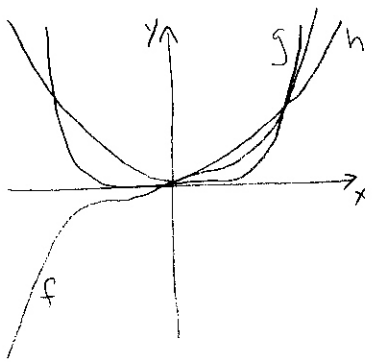
SM121 LESSON 4 3/4/5/9/13/17/19/20 26AUG08

SECTION 1.2 MATH MODELS: ESSENTIAL FUNCTIONS

(3)

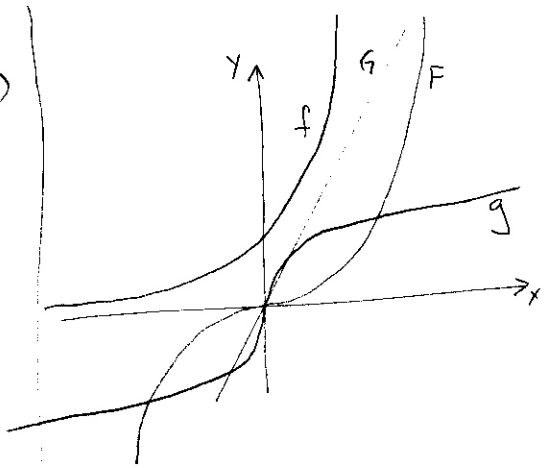


$f(x) = y = x^5$ (b)

$g(x) = y = x^8$ (c)

$h(x) = y = x^2$ (a)

(4)



$f(x) = y = 3^x$ (b)

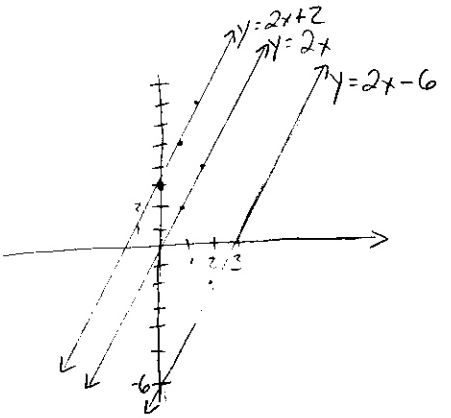
$F(x) = y = x^3$ (c)

$g(x) = y = \sqrt[3]{x}$ (d)

$G(x) = y = 3x$ (a)

(5) a) FIND AN EQUASION FOR FAMILY OF LINEAR FUNCS. w/ SLOPE = 2, SKETCH SEVERAL

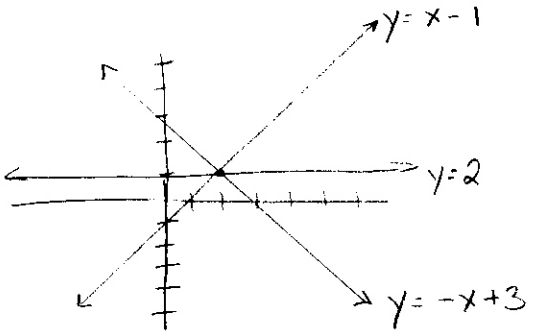
$y = 2x + b$



5 b) FIND AN EQUATION FOR FAMILY OF FUNCS. SUCH THAT $f(2)=1$

POINT $(2,1)$ IS ON LINE

$$y-1=m(x-2)$$
$$y-1=mx-2m$$
$$\boxed{y=mx-2m+1}$$



c) FROM PART a $y=2x+b$, PLUGGING IN $(2,1)$

$$1=2(2)+b$$
$$1=4+b$$
$$-3=b$$

$\boxed{\text{THE LINE } y=2x-3 \text{ SATISFIES PART a AND b}}$

9) FIND AN EXPRESSION FOR A CUBIC FUNCTION f, if $f(1)=6$ AND $f(-1)=f(0)=f(2)=0$

- ONE OF THE TERMS MUST BE ZERO FOR $x=-1$, $x=0$, AND $x=2$

$\therefore \quad (x)(x+1)(x-2)$

- WHEN $x=1$, $f(x)=6$

$$c[(x)(x+1)(x-2)]=6$$
$$c(1)(1+1)(1-2)=6$$
$$c(1)(2)(-1)=6$$
$$-2c=6$$
$$c=-3$$

$\Longrightarrow f(x)=-3x(x+1)(x-2)$

$$=-3x(x^2-x-2)$$

$$\boxed{f(x)=-3x^3+3x^2+6x}$$

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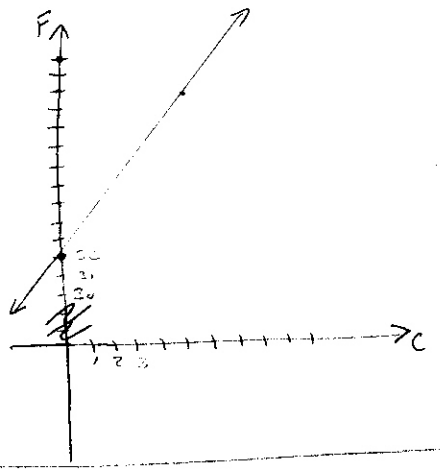
(13) $F = \frac{9}{5}C + 32$

a)



b) THE SLOPE REPRESENTS AN INCREASE OF 9°F FOR EVERY 5°C INCREASE

THE F-INTERCEPT REPRESENTS THE POINT WHEN °C = 0, THE FREEZING POINT.

(17) $4.34\ lb/in^2 / 10\ ft = 0.434\ lb/in^2/ft$

$y - 15 = 0.434(d - 0)$

$y - 15 = 0.434d$

$y = 0.434d + 15$

a) $\boxed{P(d) = 0.434d + 15}$

b) $P(d) = 100$

$100 = 0.434d + 15$

$85 = 0.434d$

$\boxed{d = 195.853\ ft}$

(19) a) APPEARS TRIGONOMETRIC $\boxed{f(x) = a\cos(bx) + c}$

b) APPEARS LINEAR $\boxed{f(x) = mx + b}$

(20) a) APPEARS EXPONENTIAL $\boxed{f(x) = a \cdot b^x \quad \text{OR} \quad f(x) = a \cdot b^x + c}$

b) APPEARS RECIPROCAL $\boxed{f(x) = \frac{a}{x}}$