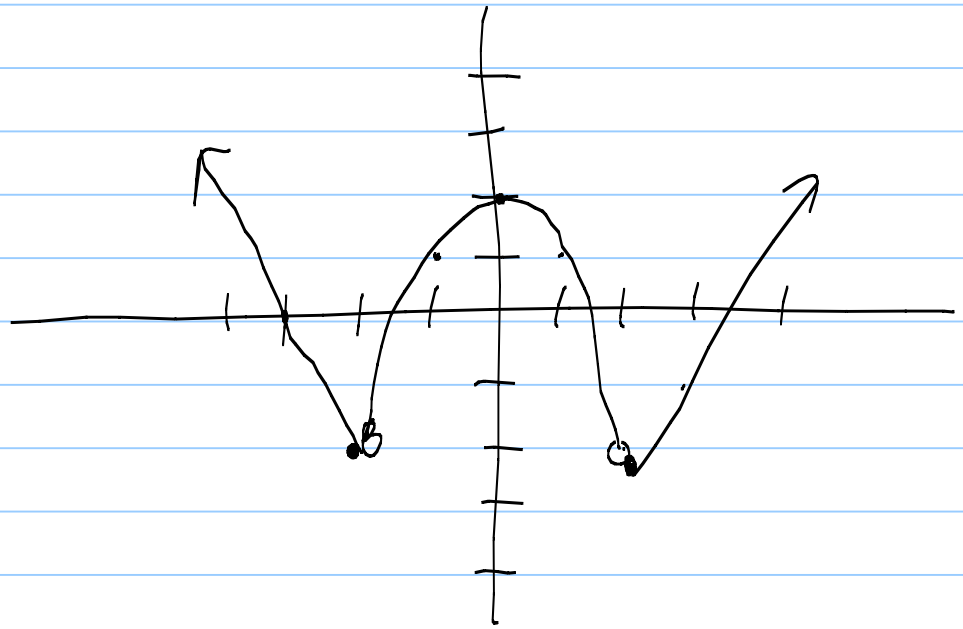
LINEAR FUNCTIONS

Note Title 2/4/2009

#34 $f(x) = \begin{cases} -2x-6 & x \leq -2 \\ 2-x^2 & -2 < x < 2 \\ 2x-6 & x \geq 2 \end{cases}$



$-x^2+2$

LINEAR FUNCTIONS

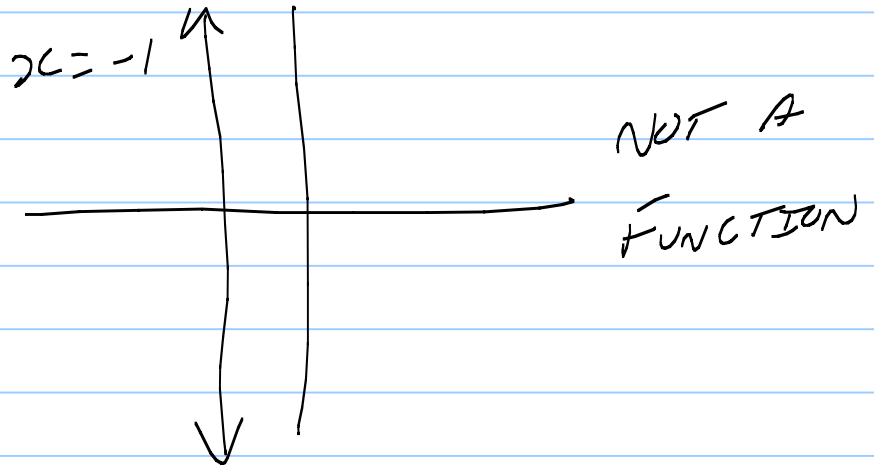
1.) HORIZONTAL LINES

$y = a$

(CONSTANT FUNCTION)

2.) VERTICAL LINE

$x = a$



EQUATION OF A LINE

$$y = mx + b$$

m: SLOPE

b: y-INTERCEPT

$$\hookrightarrow \frac{\text{RISE}}{\text{RUN}} = \frac{y_2 - y_1}{x_2 - x_1}$$

EG FIND AN EQUATION WITH SLOPE $2/3$ PASSING THROUGH $(3, 7)$

SOLN

$$y = mx + b$$

$$7 = \tfrac{2}{3}(3) + b$$

$$7 = 2 + b$$

$$5 = b$$

$$y = \tfrac{2}{3}x + 5$$

SLOPE - POINT FORM

$$(y - y_1) = m(x - x_1)$$

* NEED ANY POINT AND A SLOPE m

EX WRITE AN EQN OF A LINE WITH SLOPE 2 AND PASSES THROUGH $(5, 9)$

SOLN

$$(y - 9) = 2(x - 5)$$

DIRECT VARIATION

- HAS THE FORM $y = mx$ WHERE m IS CALLED

THE CONSTANT OF VARIATION OR CONSTANT OF PROPORTIONALITY. ALSO WRITTEN AS $y \propto x$ ($\propto$ VARIES)

IE THE AMOUNT OF STRESS IN A MATH CLASSROOM VARIES DIRECTLY WITH THE VOLUME OF NOISE. IF THERE ARE 2.5 STRESS UNITS WHEN THE VOLUME IS 10 dB, FIND THE CONSTANT OF PROPORTIONALITY.

SOLN

$$S = k \cdot V$$

$$2.5 = k \cdot 10$$

$$.25 = k$$

b) How much stress is present if the volume is 65 dB?

Soln $S = k \cdot V$

$S = .25 \cdot 65$

$S = 16.25$

Ie The force of an object varies directly as its mass. If an object has a force of 980 N it has a mass of 10 kg.

a) What is the constant of proportionality?

b) If the force is 1000N what is the mass?

Soln

a) $F = km$

$980 = k(10)$

$98 = k$

b) $\frac{1000}{98} = \frac{98m}{98}$

$10.2 = M$

IE NERDS INC. SELLS GRAPHING CALCULATORS.

THEIR REVENUE FOR EACH MONTH IS $R(x) = 200x$.

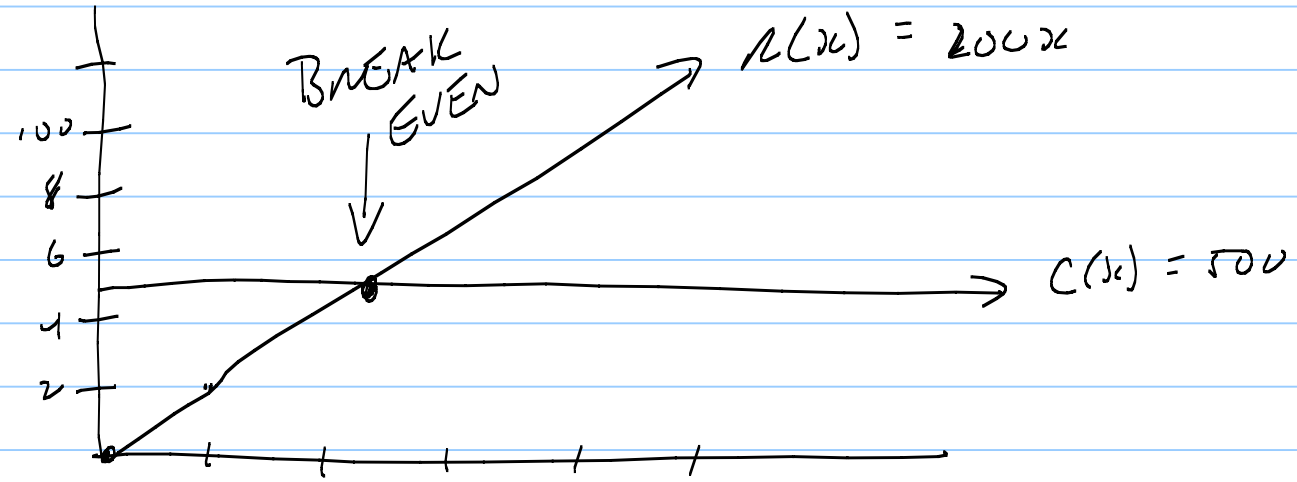
THEIR FIXED COST FOR EACH YEAR IS $C(x) = 500$

#) WHATS THE BREAK EVEN POINT?

B) WHAT'S THE GROSS REVENUE 1 YEAR LATER?
(ASSUME 5 SOLD PER MONTH)

SOLD

A)



$$\frac{200x}{200} = \frac{500}{200}$$

$$x = 2.5$$

B) GROSS REVENUE $200(60) - 500(12) =$

ECONOMICS – REVENUE / COST / PROFIT / LOSS

IF EACH WII GAME COST $80 TO BUY. THE AMOUNT OF MONEY TO CREATE THE GAME HAS AN INITIAL COST OF $10,000 AND THE COST TO PRODUCE EACH UNIT IS $5.00

A) WRITE A REVENUE $f(n)$

B) WRITE A COST $f(n)$

C) WHAT IS THE BREAK EVEN POINT?

D) WHEN IS THE COMPANY LOSING MONEY?

E) WHEN IS THE COMPANY MAKING MONEY?

F) WHAT IS THE PROFIT ON 45000 UNITS?

SOLN

A) $R(x) = 80x$

B) $C(x) = 5x + 10{,}000$

C) $R(x) = C(x)$

$80x = 5x + 10000$

$\frac{75x}{75} = \frac{10000}{75}$

$x = 134$ UNITS

D) SELLS ≤ 133 UNITS

E) SELL > 133 UNITS

F) $P(x) = R(x) - C(x)$

$P(45000) = 80(45000) - (5(45000)+10000)$

$P(45000) = \$3365000$

H/W p. 44

#17, 18, 31, 33, 50, 52, 56, 59