Math 1121

Homework   #17

#23, 48

23. $f(x) = \dfrac{x+2}{x+1}$
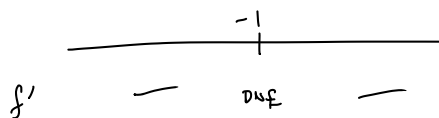
$f'(x) = \dfrac{(x+1)\cdot 1 - (x+2)\cdot 1}{(x+1)^2}$

$= \dfrac{x+1 - x - 2}{(x+1)^2} = \boxed{\dfrac{-1}{(x+1)^2}}$

$f' = 0:$ $\dfrac{-1}{(x+1)^2} = 0$

$-1 = 0$ no solns.

f' DNE: $(x+1)^2 = 0$

$x+1 = 0$

$\underline{x = -1}$

$$\begin{array}{c} \quad\quad -1 \\ \underline{} \\ f' \quad\quad - \quad\quad \text{DNE} \quad\quad - \end{array}$$

$f'(-2) = \dfrac{-1}{(-1)^2} = \dfrac{neg}{pos} = neg$

$f'(0) = \dfrac{-1}{(1)^2} = \dfrac{neg}{pos} = neg$

So f is never inc,
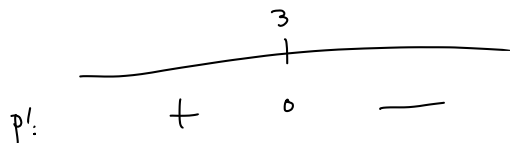
dec on $(-\infty, -1)$ and

$(-1, \infty)$.

48

$$P(x) = -(x-4)e^x - 4$$
$$= (-x+4)e^x - 4$$

$$P'(x) = (-x+4)e^x + e^x(-1)$$
$$= e^x\left(-x+4-1\right)$$
$$= e^x(-x+3)$$

$P'(x) = 0$: $e^x = 0$ $-x+3 = 0$

no solutions $x = 3$

P':

$$\begin{array}{ccc} & + & 3 \\ & & | \\ & + \quad\quad 0 & \quad - \end{array}$$

$P'(0) = e^0(-0+3) = +$
$ + \quad\quad +$

$P'(4) = e^4(-4+3) = -$
$ + \quad\quad -$

so P is

inc: $(-\infty, 3)$

dec: $(3, \infty)$