

Increasing and Decreasing Functions Ex 17.2 Q26 We have,

$$f(x) = \log(1+x) - \frac{x}{1+x}$$

$$f'(x) = \frac{1}{1+x} - \left(\frac{(1+x)-x}{(1+x)^2}\right)$$

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

$$= \frac{x}{(1+x)^2}$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow \frac{x}{(1+x)^2} = 0$$

$$\Rightarrow x = 0, -1$$

Clearly,
$$f'(x) > 0$$
 if $x > 0$
and $f'(x) < 0$ if $-1 < x < 0$ or $x < -1$

Hence, f(x) increases in $(0,\infty)$, decreases in $(-\infty,-1) \cup (-1,0)$. Increasing and Decreasing Functions Ex 17.2 Q27 We have,

$$f(x) = (x+2)e^{-x}$$

$$f'(x) = e^{-x} - e^{-x}(x+2)$$

$$= e^{-x}(1-x-2)$$

$$= -e^{-x}(x+1)$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow -e^{-x}(x+1) = 0$$

$$\Rightarrow x = -1$$

Clearly,
$$f'(x) > 0$$
 if $x < -1$
 $f'(x) < 0$ if $x > -1$

Hence, f(x) increases in $(-\infty,-1)$, decreases in $(-1,\infty)$

Increasing and Decreasing Functions Ex 17.2 Q28

We have,

$$f(x) = 10^x$$

$$f'(x) = 10^x \times \log 10$$

Now,

$$X \in R$$

$$\Rightarrow$$
 10^x > 0

$$\Rightarrow$$
 10 x log 10 > 0

$$\Rightarrow$$
 $f'(x) > 0$

Hence, f(x) in an increasing function for all x.

Increasing and Decreasing Functions Ex 17.2 Q29 **We have**,

$$f(x) = x - [x]$$

$$f'(x) = 1 > 0$$

f(x) in an increasing function on (0,1).

********** END ********