Increasing and Decreasing Functions - Key

In problems 1-3, Find the critical numbers of the function.

1. $x=\frac{5}{9}$	2. $x=2,6$
3. $x=-3,0,3$	

In problems 4-19, Find the critical numbers and the open intervals on which the function is increasing or decreasing.

4. none $\text{increasing}:(-\infty,\infty)$	5. $x=2$ $\text{decreasing}:(-\infty,2)$ $\text{increasing}:(2,\infty)$
6. $x=-7,1$ $\text{increasing}:(-\infty,-7)$ $\text{decreasing}:(-7,1)$ $\text{increasing}:(1,\infty)$	7. $x=-2,0,5$ $\text{decreasing}:(-\infty,-2)$ $\text{increasing}:(-2,0)$ $\text{decreasing}:(0,5)$ $\text{increasing}:(5,\infty)$
8. $x=0,\frac{8}{3}$ $\text{increasing}:(-\infty,0)$ $\text{decreasing}:\left(0,\frac{8}{3}\right)$ $\text{increasing}:\left(\frac{8}{3},\infty\right)$	9. $x=4$ $\text{increasing}:(-\infty,4)$ $\text{increasing}:(4,\infty)$
10. $x=-5,0,5$ $\text{decreasing}:(-\infty,-5)$ $\text{increasing}:(-5,0)$ $\text{decreasing}:(0,5)$ $\text{increasing}:(5,\infty)$	11. $x=3$ $\text{increasing}:(-\infty,3)$ $\text{increasing}:(3,\infty)$

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12. $x=\frac{1}{8}$ $\text{decreasing}:\left(-\infty,\frac{1}{8}\right)$ $\text{increasing}:\left(\frac{1}{8},\infty\right)$	13. $x=-4,0,4$ $\text{decreasing}:(-\infty,-4)$ $\text{decreasing}:(-4,0)$ $\text{increasing}:(0,4)$ $\text{increasing}:(4,\infty)$
14. $x=-2,\frac{-4}{3}$ $\text{decreasing}:\left(-2,\frac{-4}{3}\right)$ $\text{increasing}:\left(\frac{-4}{3},\infty\right)$	15. $x=-5,5$ $\text{decreasing}:(-\infty,-5)$ $\text{decreasing}:(-5,5)$ $\text{decreasing}:(5,\infty)$
16. $x=-1$ $\text{increasing}:(-\infty,-1)$ $\text{increasing}:(-1,\infty)$	17. $x=-3,-1,1$ $\text{increasing}:(-\infty,-3)$ $\text{decreasing}:(-3,-1)$ $\text{decreasing}:(-1,1)$ $\text{increasing}:(1,\infty)$
18. $x=0,2$ $\text{increasing}:(-\infty,0)$ $\text{increasing}:(0,2)$ $\text{increasing}:(2,\infty)$	19. $x=0,\frac{5}{2}$ $\text{decreasing}:(-\infty,0)$ $\text{increasing}:\left(0,\frac{5}{2}\right)$ $\text{increasing}:\left(\frac{5}{2},\infty\right)$

20. The sales of a company are modeled by $S(t)=-2.01t^2+50.1t+200,\ 1\le t\le 10$ where t is in years. Determine increasing and decreasing intervals in the range between 1 and 10.

$inc:(1,10)$

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21. The progression of a disease follows the model $C = -2t^2 + 8t + 10,\ 0 \le t \le 5$ where C is the number of cases and t is the time in years. Determine the intervals where the number of cases is increasing and decreasing.

$inc : (0,2)$
$dec : (2,5)$

22. The profit of a company is modeled by $P(x) = 3.12x - \frac{x^2}{20000} - 10000,\ 0 \le x \le 60{,}000$ where x is the number of units sold. Find the intervals where the profit is increasing and decreasing.

$inc : (0,31200)$
$dec : (31200,60000)$