

1. Find critical points
2. use # line to tell if each c.p. is min, max, or neither
3. Identify each extrema as local OR absolute

1) $g = -x^2 - 2x - 2$
 $g' = -2x - 2 = 0 / \text{DNE}$
 $-2x = 2$
 $x = -1$
 $x = -1; \text{ abs max}$

3) $f = -2s^2 + 4s - 2$
 $f' = -4s + 4 = 0$
 $-4s = -4$
 $s = 1$
 $x = 1; \text{ abs max}$

5) $s = \frac{x^2}{2} - 2x - 2$
 $s' = x - 2 = 0$
 $x = 2$
 $x = 2; \text{ abs min}$

7) $t = -2s^2 - 12s - 20$
 $t' = -4s - 12 = 0$
 $-4s = 12$
 $s = -3$
 $x = -3; \text{ abs max}$

9) $h(r) = -r^3 - 5r^2 - 8r - 6$
 $h' = -3r^2 - 10r - 8 = 0$
 $(-3r - 4)(r + 2) = 0$
 $r = -4/3, -2$
 $x = -2; \text{ rel min}$
 $x = -4/3; \text{ rel max}$

11) $f(w) = \frac{1}{w^2 - 9} = (w^2 - 9)^{-1}$
 $f' = -1(w^2 - 9)^{-2} \cdot 2w = 0$
 $2w = 0$
 $w = 0$
 $x = 0; \text{ abs max}$

2) $h(x) = -x^2 + 6x - 11$
 $h' = -2x + 6 = 0 / \text{DNE}$
 $-2x = -6$
 $x = 3$
 $x = 3; \text{ abs max}$

4) $t = 2r^2 + 12r + 13$
 $t' = 4r + 12 = 0$
 $4r = -12$
 $r = -3$
 $x = -3; \text{ abs min}$

6) $t = -2x^2 + 16x - 33$
 $t' = -4x + 16 = 0$
 $-4x = -16$
 $x = 4$
 $x = 4; \text{ abs max}$

8) $g = r^3 + 9r^2 + 24r + 14$
 $g' = 3r^2 + 18r + 24 = 0$
 $3(r^2 + 6r + 8) = 0$
 $3(r + 4)(r + 2) = 0$
 $r = -4, -2$
 $x = -4; \text{ rel abs max}$
 $x = -2; \text{ abs min rel}$

10) $f = -s^2 - 8s - 15$
 $f' = -2s - 8 = 0$
 $-2s = 8$
 $s = -4$
 $x = -4; \text{ abs max}$

12) $f(s) = \frac{s^2}{2} - 2s - 3$
 $f' = s - 2 = 0$
 $s = 2$
 $x = -2; \text{ abs min}$

$$13) f(r) = \frac{25r}{r^2 + 25}$$

$$f' = \frac{(r^2 + 25)(25) - (25r)(2r)}{(r^2 + 25)^2} = 0$$

$$\frac{-25r^2 + 625}{(r^2 + 25)^2} = 0$$

$$-25(r^2 - 5) = 0$$

$$-25(r+5)(r-5) = 0$$

$$r = \pm 5$$

$$15) h = \frac{r^2}{2} + 3r + \frac{5}{2}$$

$$h' = r + 3 = 0$$

$$r = -3$$

$$h'$$

$$f'$$

$x = -5$;
 abs rel min
 $x = 5$;
 rel min

$x = -3$;
 abs. min

$$17) y = -2\csc(2t); [-\pi, \pi]$$

$$19) g(x) = \cos(x); [-\pi, \pi]$$

$$21) t = 2\cos(x); [-\pi, \pi]$$

$$14) g = \frac{r^2}{2} - 3r + \frac{5}{2}$$

$$g' = 2t - 3 = 0$$

$$2t = 3$$

$$t = 3/2$$

$$g'$$

$x = 3/2$;
 abs min

$$16) h = -2\sin(x); [-\pi, \pi]$$

$$18) y = 2\csc(r); [-\pi, \pi]$$

$$20) g(w) = \sin(w); [-\pi, \pi]$$

$$22) f = -2\sec(2x); [-\pi, \pi]$$