

## Relative Extrema Problems Competition

For all problems, find the x-coordinate of all relative extrema and classify each as relative maximum, relative minimum, or neither. (unless problem asks for absolute maximum and absolute minimum values)

### One Point Questions:

1.  $f'(x) = -x(x+2)(x-3)(x+4)^2$

2.  $f(x) = x^3 - \frac{9}{2}x^2 - 12x + 7$

3.  $f(x) = (2x-1)^5$

### Two Point Questions:

4.  $f(x) = \frac{1}{2}x - \sin x$        $[0, 2\pi)$

5.  $f(x) = 5x^{\frac{2}{5}} - 10x^{\frac{-3}{5}}$

6.  $f(x) = x^2 e^{2x}$

7.  $f(x) = x(3x-1)^2$

8.  $f(x) = \frac{x^4}{4} - x^3 - 2x^2$

Find absolute max and min values on  $[-2, 2]$

### Three Point Questions:

9.  $f(x) = \frac{x^2 - 2x + 1}{x - 3}$

10.  $f(x) = (-x^2)(x+1)^4$

### Answers:

1. Rel max:  $x = -2, 3$  Rel min:  $x = 0$ ,  
Neither:  $x = -4$

2. Rel max:  $x = -1$  Rel min:  $x = 4$

3. Neither:  $x = \frac{1}{2}$

4. Rel max:  $x = \frac{5\pi}{3}$  Rel min:  $x = \frac{\pi}{3}$

5. Rel min:  $x = -3$  Neither:  $x = 0$

6. Rel max:  $x = -1$  Rel min:  $x = 0$

7. Rel max:  $x = \frac{1}{9}$  Rel min:  $x = \frac{1}{3}$

8. Absolute Maximum:  $(-2, 4)$ ,  
Absolute Minimum:  $(2, -12)$

9. Rel max:  $x = 1$  Rel min:  $x = 5$ , Neither:  $x = 3$

10. Rel max:  $x = -1, 0$  Rel min:  $x = \frac{-1}{3}$