

1. Sketch a graph with the following properties:

- (a)  $f$  is continuous on  $[-5, 5]$
- (b) Local maxima at 0 and 3
- (c) Local minimum at  $-2$
- (d)  $f'(x)$  exists everywhere except  $x = 1$
- (e) Absolute maximum at  $-5$
- (f) Absolute minimum at 1

2. Sketch a graph with the following properties:

- (a)  $f$  is continuous on  $(-5, 5]$
- (b)  $f'$  is continuous on  $(-5, 5)$
- (c) Local maximum at 4
- (d) Local minimum at 1
- (e) No absolute minimum
- (f) Absolute maximum at  $-2$

3. Find the critical numbers of the function  $f(x) = x^3 + 3x^2 - 9x - 7$

4. Find the critical numbers of the function  $f(x) = \sqrt{x-5}(x+16)$

5. Find the critical numbers of the function  $f(x) = x^{2/3}(x-5)^2$

6. Find the critical numbers of the function  $f(x) = \cot x + 9x$

7. Find all absolute and local maxima and minima of the function  $f(x) = \frac{\ln x}{x^3}$

8. Find all absolute and local maxima and minima of the function  $f(x) = \frac{\sqrt{x+3}}{x}$

9. Find all absolute and local maxima and minima of the function  $f(x) = \ln(x^2 - 4x + 5)$

10. Find all absolute and local maxima and minima of the function  $f(x) = x^2 e^{-x}$