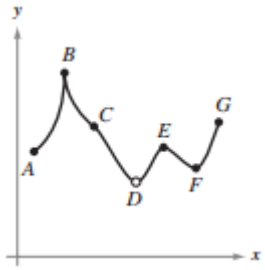
Absolute Extrema



1. Label each lettered point as a relative minimum, relative maximum, absolute minimum, absolute maximum.
2. Define CRITICAL VALUE.
3. What is the EXTREME VALUE THEOREM?
4. Draw a continuous function on [-2,5] where the absolute minimum is where $f'(x)=0$ and the absolute maximum is at an endpoint.
5. Draw a continuous function on [-1,3] where the absolute minimum and the absolute maximum is at the endpoints.
6. Draw a continuous function on [0,7] where the absolute maximum is where $f'(x)=0$ and the absolute maximum is where $f'(x)$ is undefined.

Find the critical numbers of each function.

7. $f(x)=x^2(x-3)$
8. $g(t)=t\sqrt{4-t}$
9. $h(x)=\sin^2 x+\cos x\ ;\ 0\le x<2\pi$
10. $f(x)=\dfrac{4x}{x^2+1}$

Locate the absolute extrema on the given interval.

11. $f(x)=2x^2+\dfrac{4}{x}$ on [½, 2]
12. $f(x)=x^3-6x^2+9x+2\ ;\ [-1,5]$
13. $g(t)=\dfrac{t^2}{t^2+3}\ ;\ [-1,1]$
14. $g(x)=\sqrt[3]{x}\ ;\ [-1,1]$
15. $f(x)=3x^{2/3}-2x\ ;\ [-1,1]$
16. $f(x)=-x^2+3x\ ;\ [0,3]$
17. $f(x)=x^3-\dfrac{3}{2}x^2\ ;\ [-1,2]$
18. $f(x)=\cos\pi x\ ;\ \left[0,\dfrac{1}{6}\right]$

Answers

1. –
a. neither
b. abs & rel max
c. neither
d. neither
e. rel max
f. rel min
g. neither
2. Value or number where the derivative is ZERO or UNDEFINED.
3. Consult your notes!
4. –
5. –
6. –
7. 0, 2
8. 8/3, 4
9. $0,\pi,\dfrac{\pi}{3},\dfrac{5\pi}{3}$
10. -1,1
11. Absolute maximum is 10 at x=2
    Absolute minimum is 6 at x=1
12. Absolute maximum is 22 at x=5
    Absolute minimum is -14 at x=-1
13. Absolute maximum is 1/4 at x=1,-1
    Absolute minimum is 0 at x=0
14. Absolute maximum is 1 at x=1
    Absolute minimum is -1 at x=-1
15. Absolute maximum is 5 at x=-1
    Absolute minimum is 1 at x=1
16. Absolute maximum is 9/4 at x=3/2
    Absolute minimum is 0 at x=0,3
17. Absolute maximum is 2 at x=2
    Absolute minimum is -5/2 at x=-1
18. Absolute maximum is 1 at x=0
    Absolute minimum is $\sqrt{3}/2$ at x=1/6