Given below is the graph of $f^{\prime}$ the first derivative of $f$. Use it to answer \#1 and 2 .


1. Over what interval(s) is $f$ decreasing? Explain in detail.

D-AD8
3. Find the absolute extrema of $f(x)=2 x^{3}-6 x-2$ over the interval $[-4,0]$.
4. Find and classify all relative maxima and relative minima of $f(x)=-x^{3}+3 x^{2}+2$. Justify your classifications.

D-AD9
5. For what interval(s) is the function $f(x)=x^{3}+3 x^{2}-9 x+7$ increasing? Justify your answer.

## D-CD8

6. Find the value of $c$ guaranteed to exist by the Mean Value Theorem for $f(x)=x^{3}-2 x^{2}$ over $[0,2]$.
7. Find the value of $c$ guaranteed to exist by the Mean Value Theorem for $f(x)=\sqrt{x}$ over $[0,4]$

## D-AD17

8. The position, in feet, of a particular moving body is modeled as a differentiable function of time, in seconds, by $s(t)=3 \sin 2 t-4 \cos 5 t$. Find the initial velocity and acceleration of the object. Include units in your answer.
9. The position of a moving body is given by $f(x)=x^{3}-2 x^{2}-5 x-1$ where $f$ is in meters and $x$ is in seconds. Find the velocity of the object when the acceleration is 0 . Include units in your answer.
