**Use the graph of each function to estimate intervals on which the function is increasing, decreasing, or constant. Support the answer numerically.**

|  |  |  |
| --- | --- | --- |
| **1.** |  |  |
| **2.** |  |  |
| **3.** |  |  |
| **4.** |  |  |

**Approximate the relative extrema of each function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **5.** |  | **6.** |  |
|  |  |  |  |

**Approximate the relative and absolute extrema of each function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **7.** |  | **8.** |  |
|  |  |  |  |

**Estimate and classify the extrema for the graph of each function. Support the answers numerically.**

|  |  |  |
| --- | --- | --- |
| **9.** |  |  |
| **10.** |  |  |

**Find the average rate of change of each function on the given interval.**

|  |  |  |  |
| --- | --- | --- | --- |
| **11.** |  | **12.** |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **13.** |  | **14.** |  |
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|  |  |  |
| --- | --- | --- |
| **15.** |  |  |

|  |  |  |
| --- | --- | --- |
| **16.** |  |  |

**SOLVE THE PROBLEM**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **17.** | Maria records her distance from home over time. The values are shown in the table below. Find her average speed over the first 4 hours.     |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  | |
|  |  |

**ANSWERS**

**Use the graph of each function to estimate intervals on which the function is increasing, decreasing, or constant. Support the answer numerically.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1.** |  | From the graph, it appears that:  A function- is increasing for  A function -is decreasing for  The critical point is   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |   The table supports this conjecture**.** |
| **2.** |  | From the graph, it appears that:  A function is increasing for  A function is decreasing for  The critical points are   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |   The tables support this conjecture. |
| **3.** |  | From the graph, it appears that:  A function is decreasing for   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |   The table supports this conjecture. |
| **4.** |  | From the graph, it appears that:  A function is constant for  A function is increasing for  A function is decreasing for  The critical points are   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |   The tables support this conjecture. |

**Approximate the relative extrema of each function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **5.** |  | **6.** |  |
|  | Relative minimum  Relative maximum |  | Relative minimum  Relative maximum |

**Approximate the relative and absolute extrema of each function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **7.** |  | **8.** |  |
|  | Relative minimum  Relative maximum  Absolute minimum  No absolute maxima |  | Relative minimum  Relative maximum  Absolute minimum  No absolute maxima |

**Estimate and classify the extrema for the graph of each function. Support the answers numerically.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **9.** | For interval the function is decreasing.  In has relative minimum.  For interval the function is increasing.  In has relative maximum.  For interval the function is decreasing. | From the graph, it appears that:  has relative minimum in  has relative maximum in  and  has no absolute maxima and absolute minima.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  | |  |  |  |  |  |  |   The tables support this conjecture. |
| **10.** | For interval the function is decreasing.  In  has absolute minimum.  For interval the function is increasing.  In hasrelative maximum.  For interval the function is decreasing.  In  hasabsolute minimum.  For interval the function is increasing. | From the graph, it appears that:  has relative maximum in  has absolute minimum in and  and  has no absolute maxima.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  |   The tables support this conjecture. |

**Find the average rate of change of each function on the given interval.**

|  |  |  |  |
| --- | --- | --- | --- |
| **11.** |  | **12.** |  |
|  | The average rate of change on the intervalis . |  | The average rate of change on the intervalis |

|  |  |  |  |
| --- | --- | --- | --- |
| **13.** |  | **14.** |  |
|  | The average rate of change on the intervalis . |  | The average rate of change on the intervalis |

|  |  |  |
| --- | --- | --- |
| **15.** |  |  |

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| --- | --- | --- |
| **16.** |  |  |

**SOLVE THE PROBLEM**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **17.** | Maria records her distance from home over time. The values are shown in the table below. Find her average speed over the first 4 hours.     |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  | |
|  | Average speed over the first 4 hours  The average speed is **55 miles per hour.** |