Preface

Here are a set of problems for my Calculus I notes. These problems do not have any solutions available on this site. These are intended mostly for instructors who might want a set of problems to assign for turning in. I try to put up both practice problems (with solutions available) and these problems at the same time so that both will be available to anyone who wishes to use them.

As with the set of practice problems I write these as I get the time and some sections will have only a few problems at this point and others won’t have any problems in them yet. Rest assured that I’m always trying to get more problems written but this site has been written and maintained in my spare time and so I usually cannot devote as much time as I’d like to the site.

Minimum and Maximum Values

1. Below is the graph of some function, \( f(x) \). Identify all of the relative extrema and absolute extrema of the function.

2. Below is the graph of some function, \( f(x) \). Identify all of the relative extrema and absolute extrema of the function.
3. Below is the graph of some function, \( f(x) \). Identify all of the relative extrema and absolute extrema of the function.

4. Below is the graph of some function, \( f(x) \). Identify all of the relative extrema and absolute extrema of the function.
4. Sketch the graph of \( f(x) = 3 - \frac{1}{2}x \) and identify all the relative extrema and absolute extrema of the function on each of the following intervals.
   (a) \((-\infty, \infty)\)
   (b) \([-3, 2]\)
   (c) \([-4, 1]\)
   (d) \((0, 5)\)

5. Sketch the graph of \( g(x) = (x - 2)^2 + 1 \) and identify all the relative extrema and absolute extrema of the function on each of the following intervals.
   (a) \((-\infty, \infty)\)
   (b) \([0, 3]\)
   (c) \([-1, 5]\)
   (d) \([-1, 1]\)
   (e) \([1, 3]\)
   (f) \((2, 4)\)

6. Sketch the graph of \( h(x) = e^{3-x} \) and identify all the relative extrema and absolute extrema of the function on each of the following intervals.
   (a) \((-\infty, \infty)\)
   (b) \([-1, 3]\)
   (c) \([-6, -1]\)
   (d) \((1, 4)\)

7. Sketch the graph of \( h(x) = \cos(x) + 2 \) and identify all the relative extrema and absolute extrema of the function on each of the following intervals. Do, all work for this problem in radians.
   (a) \((-\infty, \infty)\)
   (b) \(\left[-\frac{\pi}{3}, \frac{\pi}{4}\right]\)
   (c) \(\left[-\frac{\pi}{2}, 2\pi\right]\)
   (d) \(\left[\frac{1}{2}, 1\right]\)
8. Sketch the graph of a function on the interval $[3, 9]$ that has an absolute maximum at $x = 5$ and an absolute minimum at $x = 4$.

9. Sketch the graph of a function on the interval $[0, 10]$ that has an absolute minimum at $x = 5$ and an absolute maximum at $x = 0$ and $x = 10$.

10. Sketch the graph of a function on the interval $(-\infty, \infty)$ that has a relative minimum at $x = -7$, a relative maximum at $x = 2$ and no absolute extrema.

11. Sketch the graph of a function that meets the following conditions:
   (a) Has at least one absolute maximum.
   (b) Has one relative minimum.
   (c) Has no absolute minimum.

12. Sketch the graph of a function that meets the following conditions:
   (a) Graphed on the interval $[2, 9]$.
   (b) Has a discontinuity at some point interior to the interval.
   (c) Has an absolute maximum at the discontinuity in part (b).
   (d) Has an absolute minimum at the discontinuity in part (b).

13. Sketch the graph of a function that meets the following conditions:
   (a) Graphed on the interval $[-4, 10]$.
   (b) Has no relative extrema.
   (c) Has an absolute maximum at one end point.
   (d) Has an absolute minimum at the other end point.

14. Sketch the graph of a function that meets the following conditions:
   (a) Has a discontinuity at some point.
   (b) Has an absolute maximum and an absolute minimum.
   (c) Neither absolute extrema occurs at the discontinuity.