Preface

Here are a set of practice problems for my Calculus I notes. If you are viewing the pdf version of this document (as opposed to viewing it on the web) this document contains only the problems themselves and no solutions are included in this document. Solutions can be found in a number of places on the site.

1. If you'd like a pdf document containing the solutions go to the note page for the section you'd like solutions for and select the download solutions link from there. Or,

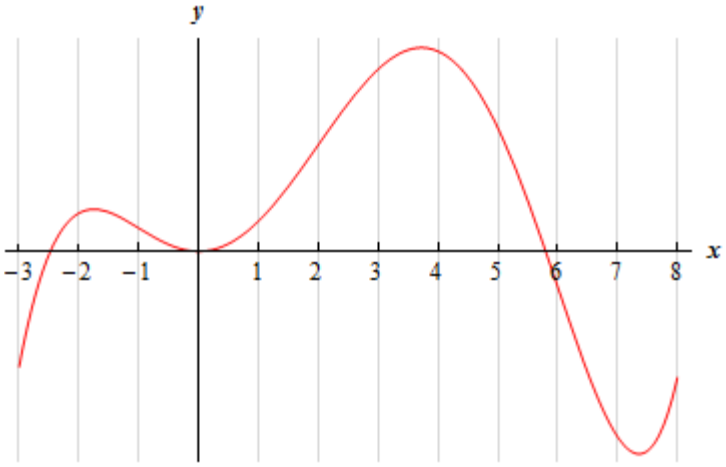
2. Go to the download page for the site http://tutorial.math.lamar.edu/download.aspx and select the section you'd like solutions for and a link will be provided there.

3. If you'd like to view the solutions on the web or solutions to an individual problem you can go to the problem set web page, select the problem you want the solution for. At this point I do not provide pdf versions of individual solutions, but for a particular problem you can select "Printable View" from the "Solution Pane Options" to get a printable version.

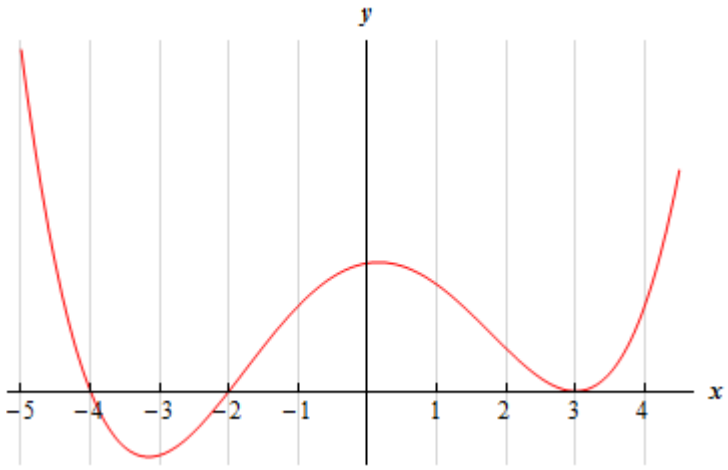
Note that some sections will have more problems than others and some will have more or less of a variety of problems. Most sections should have a range of difficulty levels in the problems although this will vary from section to section.

The Shape of a Graph, Part II

1. The graph of a function is given below. Determine the open intervals on which the function is concave up and concave down.



2. Below is the graph the **2nd derivative** of a function. From this graph determine the open intervals in which the **function** is concave up and concave down.



For problems 3 – 8 answer each of the following.

(a) Determine a list of possible inflection points for the function.

(b) Determine the open intervals on which the function is concave up and concave down.

(c) Determine the inflection points of the function.

3. $f\left(x\right)=12+6x^2-x^3$

4. $g\left(z\right)=z^4-12z^3+84z+4$

5. $h\left(t\right)=t^4+12t^3+6t^2-36t+2$

6. $h\left(w\right)=8-5w+2w^2-\cos\left(3w\right)$ on $\left[-1,2\right]$

7. $R\left(z\right)=z\left(z+4\right)^{\frac{2}{3}}$

8. $h\left(x\right)=\mathbf{e}^{4-x^2}$

For problems 9 – 14 answer each of the following.

(a) Identify the critical points of the function.

(b) Determine the open intervals on which the function increases and decreases.

(c) Classify the critical points as relative maximums, relative minimums or neither.

(d) Determine the open intervals on which the function is concave up and concave down.

(e) Determine the inflection points of the function.

(f) Use the information from steps **(a)** – **(e)** to sketch the graph of the function.

9. $g(t) = t^5 - 5t^4 + 8$

10. $f(x) = 5 - 8x^3 - x^4$

11. $h(z) = z^4 - 2z^3 - 12z^2$

12. $Q(t) = 3t - 8\sin\left(\frac{t}{2}\right)$ on $[-7, 4]$

13. $f(x) = x^{\frac{4}{3}}(x - 2)$

14. $P(w) = w\mathbf{e}^{4w}$ on $[-2, \frac{1}{4}]$

15. Determine the minimum degree of a polynomial that has exactly one inflection point.

16. Suppose that we know that $f(x)$ is a polynomial with critical points $x = -1$, $x = 2$ and $x = 6$. If we also know that the 2nd derivative is $f''(x) = -3x^2 + 14x - 4$. If possible, classify each of the critical points as relative minimums, relative maximums. If it is not possible to classify the critical points clearly explain why they cannot be classified.