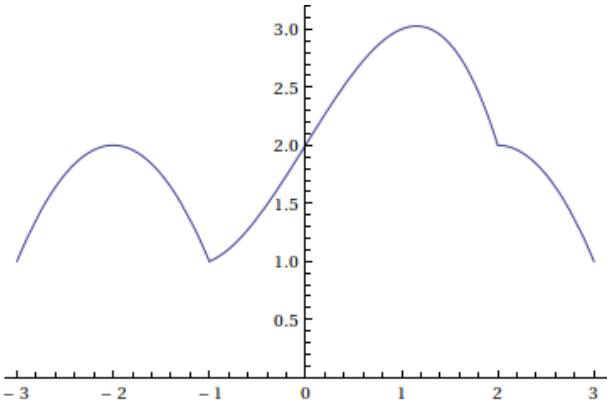
MATH1210: Midterm 3 Practice Exam

The following are practice problems for the third exam. This practice test does not cover all the material that you are required to know for the exam. However, this test is approximately the same length as the exam.

1. Use differentials to approximate $\sqrt{48.7}$.
2. Find the maxima and minima (if they exist) of the following functions on the specified intervals
   (a) $f(x) = \dfrac{1}{x}$ on $(1, 3]$
   (b) $g(x) = x^3 - 3x^2 - x + 3$ on $[-1, 4]$
3. Sketch the graph of a function, f, defined on $[0, 6]$ and satisfying
   - $f(0) = 8$
   - $f(6) = -2$
   - f is decreasing on the interval $(0, 6)$
   - f has an inflection point at the ordered pair $(2, 3)$
   - f is concave up on $(2, 6)$
4. Let $f(x)$ be the function whose graph is shown here:



   (a) Identify all the critical points of $f(x)$.
   (b) Identify all the inflection points of $f(x)$.
5. §3.4 Exercise 12, 14, 36, 42
6. Let $f(x) = \dfrac{z^2 + 1}{z}$
   (a) Find the x and y intercepts of f.
   (b) Find the critical points of f.

(c) Identify the regions where f is increasing and where f is decreasing.

(d) Find the inflection points of f.

(e) Identify the regions where f is concave up and where f is concave down.

(f) Find the values of f at the critical and inflection points.

(g) Graph f.

7. Consider the function $f(x) = s^2 + 3s - 1$ on $[-3, 1]$. Does the Mean Value Theorem for derivatives apply to $f(s)$? If so, find all points $c \in [-3, 1]$ that satisfy the mean value theorem. If not, explain why.

8. The function $g(x) = x^2 - 2$ has a root in between $x = 1$ and $x = 2$. Use the Bisection Method to approximate the root of $g(x)$ to an accuracy of 0.25.

9. Compute the following indefinite integrals:

(a) $\displaystyle\int f(x) = 3x^2 + \sqrt{3}\,\mathrm{d}x$

(b) $\displaystyle\int \frac{s(s+1)^2}{\sqrt{s}}\,\mathrm{d}s$