The total was scored out of 10 (Q1=2, Q2=1, Q3=3, Q4=2, Q5=2) and the average was 8.5. A few comments:

- For Q1, you NEED to say something that shows you understand why the Riemann sums actually converge to the integral. One way is to notice that the limiting function $f$ is continuous and $||P|| \to 0$ and then you can use theorem 5.13. There are other ways as well but this is absolutely needed.

- For Q3a, it suffices to assume that $f$ is increasing (why?). Then since $f$ is increasing, $M_i = f(x_i)$ and $m_i = f(x_{i-1})$ and the sum telescopes. Should be only a couple lines.

- For Q3b, please don’t write $\epsilon/(f(b) - f(a))$ without first considering the case $f(b) = f(a)$. This case is really trivial but you should always make sure you aren’t dividing by zero!

- Q4 was proved in math 120 so for those students it was a good review and for those of who you didn’t take that class, it might have been tricky. If you weren’t in math 120, you just proved that both $\mathbb{Q}$ and $\mathbb{Q}^C$ are dense in $\mathbb{R}$...a notion that you will make precise in math 320.

- Q5a was a stumbling block for many of you. Many of you tried to first assume that $f \geq 0$ and then $M_i' = M_i$ etc and same for $f \leq 0$. But if $m_i < 0 < M_i$, this sort of falls apart. Many of you said that in this case, $M_i' = |m_i|$ or $M_i' = |M_i|$ but this simply isn’t true. Consider the function

$$f(x) = \begin{cases} 
3 & : 0 \leq x \leq 1 \\
1 & : 1 \leq x \leq 2 \\
-2 & : 2 \leq x \leq 3 
\end{cases}$$

Then $M = 3$, $m = -2$ and $M' = 3$, $m' = 1$. If you want to do the problem properly, you really need to use an argument as in the hint. HW 1 Question 4 comes in handy here. Read the solutions if you’re unsure how to procede.