Final answers script in beta

Final Answers
MATH104 December 2011

How to use this resource

- When you feel reasonably confident, simulate a full exam and grade your solutions. For your grading you can get the full solutions here.
- If you're not quite ready to simulate a full exam, we suggest you thoroughly and slowly work through each problem. Use this document with the final answers only to check if your answer is correct, without spoiling the full solution.
- Should you need more help, check out the hints and video lecture on the Math Educational Resources.

Tips for Using Previous Exams to Study: Work through problems

Resist the temptation to read any of the final answers below before completing each question by yourself first! We recommend you follow the guide below.

1. **How to use the final answer:** *The final answer is not a substitution for the full solution!* The final answer alone will not give you full marks. The final answer is provided so that you can check the correctness of your work without spoiling the full solution.
   - To answer each question, only use what you could also use in the exam. Download the raw exam here.
   - If you found an answer, how could you verify that it is correct from your work only? E.g. check if the units make sense, etc. Only then compare with our result.
   - If your answer is correct: good job! Move on to the next question.
   - Otherwise, go back to your work and check it for improvements. Is there another approach you could try? If you still can't get to the right answer, you can check the full solution on the Math Educational Resources.
2. **Reflect on your work:** Generally, reflect on how you solved the problem. Don't just focus on the final answer, but whether your mental process was correct. If you were stuck at any point, what helped you to go forward? What made you confident that your answer was correct? What can you take away from this so that, next time, you can complete a similar question without any help?
3. **Plan further studying:** Once you feel confident enough with a particular topic, move on to topics that need more work. Focus on questions that you find challenging, not on those that are easy for you. Once you are ready to tackle a full exam, follow the advice for the full exam (click here).

Please note that all final answers were extracted automatically from the full solution. It is possible that the final answer shown here is not complete, or it may be missing entirely. In such a case, please notify `mer-wiki@math.ubc.ca`. Your feedback helps us improve.

This pdf was created for your convenience when you study Math and prepare for your final exams. All the content here, and much more, is freely available on the Math Educational Resources.

Question 1 (a)

Easiness: 80/100

FINAL ANSWER. $\lim_{x\to 4} \frac{x^2-3x-4}{\sqrt{x}-2} = 20$.

Question 1 (b)

Easiness: 85/100

FINAL ANSWER. $a = -1/4$ Therefore, a = -1/4.

Question 1 (c)

FINAL ANSWER. $f'(x) = \frac{\left((2x+6\sin x\cos x)e^{x^2}+(x^2+3\sin^2 x)(2xe^{x^2})\right)(x^4+7)-(x^2+3\sin^2 x)e^{x^2}4x^3}{(x^4+7)^2}$ Luckily, no further simplification is required for this question.

Question 1 (d)

Easiness: 95/100

FINAL ANSWER. Therefore, the required equation is y = -5x +3.

Question 1 (e)

Easiness: 100/100

FINAL ANSWER. The absolute maximum occurs at $x = +1$.

Question 1 (f)

Easiness: 70/100

FINAL ANSWER. $f''(1) = 26$.

Question 1 (g)

FINAL ANSWER. $\left(\frac{1}{\sqrt{2}}, \infty\right)$

Question 1 (h)

FINAL ANSWER. $t = \ln(3^{25/3})$ Whether this simplification would be necessary is up to your instructor.

Question 1 (i)

FINAL ANSWER. $y = -\frac{4}{3}x + \frac{10}{3}$ which is the equation of the tangent line at (1,2).

Question 1 (j)

Easiness: 43/100

FINAL ANSWER. The answer is (A) I only.

Question 1 (k)

Easiness: 98/100

FINAL ANSWER. (e) This is true as this is the definition of continuity and $g(x)$ is given to be continuous.

Question 1 (l) **Easiness: 89/100**

FINAL ANSWER. The correct answer is therefore **B**.

Question 1 (m) **Easiness: 82/100**

FINAL ANSWER. $m = \sqrt{50}$.

Question 1 (n) **Easiness: 100/100**

FINAL ANSWER. (This answer is already expressed in lowest terms.)

Question 2 (a) **Easiness: 74/100**

FINAL ANSWER. If they were, say at x=a, we would have to take the limit of f'(x) for = If they were, say at x=a, we would have to take the limit of f'(x) for $x \to a$ to determine if *f'(x)* did not exist or was zero (or another finite number)."

Question 2 (b)

FINAL ANSWER. If they were, say at x=a, we would have to take the limit of *f"(x)* as = If they were, say at x=a, we would have to take the limit of *f"(x)* as $x \to a$ to determine if *f"(x)* did not exist or was zero (or another finite number)."

Question 2 (c) **Easiness: 84/100**

FINAL ANSWER. $(-\sqrt{6}, -\sqrt{3}) \cup (-\sqrt{3}, -1) \cup (1, \sqrt{3}) \cup (\sqrt{3}, \sqrt{6})$

Question 2 (d) **Easiness: 1/100**

FINAL ANSWER. Therefore $f(x)$ is concave up on $(-\sqrt{3}, 0) \cup (\sqrt{3}, \infty)$ and concave down on $(-\infty, -\sqrt{3}) \cup (0, \sqrt{3})$.

Question 2 (e)

FINAL ANSWER.

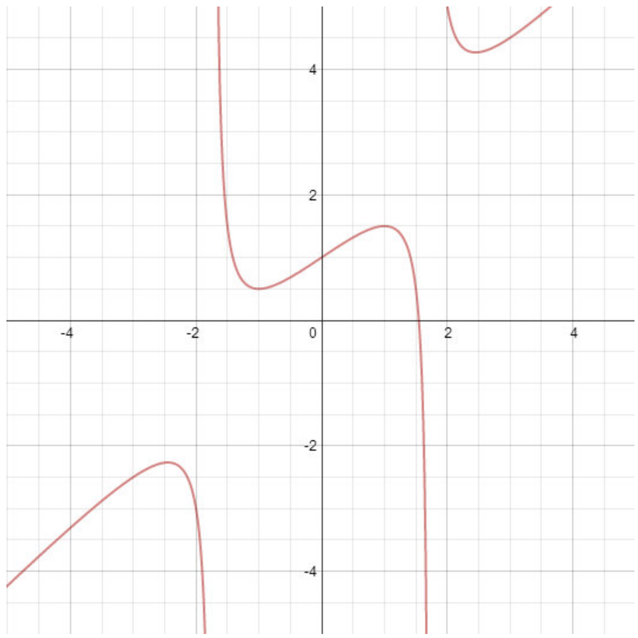
- $\left(-\sqrt{6}, 1 - \frac{4\sqrt{6}}{3}\right)$ is a local maxima,
- $\left(-1, \frac{1}{2}\right)$ is a local minima,
- $\left(1, \frac{3}{2}\right)$ is a local maxima,
- $\left(\sqrt{6}, 1 + \frac{4\sqrt{6}}{3}\right)$ is a local minima, and
- $(0, 1)$ is an inflection point.

Question 2 (f) **Easiness: 64/100**

FINAL ANSWER. $y = x + 1$.

Question 2 (g)

FINAL ANSWER.



Question 3

Easiness: 98/100

FINAL ANSWER. $x = 5^{2/3}$.

Question 4

FINAL ANSWER. Which is our answer.

Question 5 (a)

FINAL ANSWER. Thus, by using the elasticity formula above, we get $\epsilon = -1/3$.

Question 5 (b)

FINAL ANSWER. As $\epsilon = -1/3 > -1$, the product is price inelastic and to increase revenue, price should be increased.

Question 5 (c)

FINAL ANSWER. $$\begin{aligned} x &= 5/\epsilon \\ &= 5/(-1/3) \\ &= 5(-3) \\ &= -15\% \end{aligned} = \begin{aligned} x &= 5/\epsilon \\ &= 5/(-1/3) \\ &= 5(-3) \\ &= -15\% \end{aligned}$$ .This is a negative number, as we'd expect (to increase demand, the price must decrease).The price should be decreased by about 15% to yield a 5% increase in demand.

Question 5 (d)

FINAL ANSWER. We need $\frac{p}{q}\frac{dq}{dp} = -1$ and not $\frac{q}{p}\frac{dq}{dp} = -1$.

Question 6 (a)

FINAL ANSWER. $\ln(0.9) \approx L(0.9) = -0.1$

Question 6 (b)

FINAL ANSWER. $|\text{Error}| \leq \frac{\frac{100}{81}}{200} = \frac{1}{162}$

Question 6 (c)

FINAL ANSWER. $\left[-0.1 - \frac{1}{162}, -0.1\right]$,where we have used our upper bound on the error from part (b) to help define the lower bound on our interval.

Question 6 (d)

FINAL ANSWER. $\ln(0.9) \approx Q(0.9) = -0.105$

Question 6 (e)

FINAL ANSWER. Indeed the error term was greater than the magnitude of the quadratic correction term in the quadratic approximation: $(1/162 = 0.0061... > 0.005)$