SAMPLE MATH1040 Final Exam IPSWICH, 2006

Time allowed: 120 minutes
In addition, there will be 10 minutes for perusal
Total marks on this paper: 115
Pocket calculators allowed

You will be issued with a single sheet of blank paper. During perusal, you may write on the blank sheet, but not on this exam booklet. Do not write on the single sheet once perusal is over. Your single sheet will be collected with your exam script and will be destroyed (so material written on that sheet will not be assessed).

This sample exam shows what to expect on your real exam. The number of marks for each question is shown here, along with some practice questions from your study guide that cover the same topic. Note that the study guide includes worked solutions to all the questions. Your exam has the same formulae sheet at the end. I think this is a very useful study guide!

1. 9 parts, worth 1 mark each.
   (a) p83 Q3a, p90 Q6a, p96 Q6a, p102 Q6a
   (b)(c) p82 Q5, 6, 7, p88 Q5, 6, 7, p94 Q5, 6, 7, p100 Q4, 8
   (d)(e) Tutorial assignment 7, Q1j, 2j
   (f,g,h) Tutorial assignment 8, Q1e, 2e
   (i) p107 Q10a, p113 Q10a, c, p119 Q10a, c

2. Identifying graphs. 8 parts, worth 1 mark each. Try the graph questions on p83, p89, p95, p101, p107 Q12, p113 Q13, p120 Q13, p125 Q16, p130 Q15

3. 3 marks. p84 Q9, p95 Q10, p106 Q5, p112 Q8, p118 Q8, p124 Q8

4. 3 parts, worth 2 marks, 3 marks, 2marks. Part (a) is on parallel lines; see P90 Q12; Part (b) is on perpendicular lines P96 Q13, P102 Q13, Part (c) is on distance P84 Q8, P90 Q12, P96 Q12, P102 Q12, P112 Q6, P118 Q6, P124 Q6.

5. 2 parts, worth 4 marks and 3 marks. p106 Q6, also see your lecture notes.

6. 3 parts, worth 2 marks each, Tute assignment 7 Qns 1 k,l and 2 k,l

7. 3 marks. p 90 Q4, p96 Q4, p102 Q4, p124 Q4

8. 4 marks. Composition of functions. See your lecture notes.

9. 6 marks. p108 Q15, also see your lecture notes.

10. 5 marks. p106 Q1, p112 Q1, p118 Q1, p124 Q1, p129 Q1

11. 3 parts, worth 1 mark, 2 marks, 4 marks. Involves functions, absolute values and solving equations.

12. 3 parts, worth 3 marks, 4 marks, 3 marks. p107 Q11a, p113 Q10d, f, p119 Q10e, f, g, p125 Q20, p107 Q11b, p113 Q10e, f, p124 Q11, p129 Q11, p107 Q10c, p108 Q16, p120 Q16, p124 Q12, p130 Q19
13. 8 marks. Find and classify critical points of a function. See lecture notes and p124 Q13, p129 Q12

14. 3 parts, worth 1 mark, 2 marks and 3 marks. p108 Q14, p114 Q15, p120 Q15, p125 Q18, p130 Q17

15. 2 parts, worth 8 marks and 2 marks. p108 Q13, p114 Q14, p120 Q14, p125 Q17, p130 Q16

16. 6 marks. A mystery question involving functions, derivatives, and rules for differentiation.

17. 5 parts, worth 2 marks, 2 marks, 2 marks, 2 marks and 3 marks. Answer questions about functions and derivatives. Try p119 Q12, P113 Q12, P107 Q9. Yours is a little bit different.

Formulae Sheet:

Distance between \((x_1, y_1)\) and \((x_2, y_2)\):

\[ d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \]

Gradient of line joining \((x_1, y_1)\) and \((x_2, y_2)\):

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

Roots of \(ax^2 + bx + c = 0\) are:

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

Product rule:

\[ (uv)' = u'v + uv' \]

Chain rule:

\[ \frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx} \]

Quotient rule:

\[ \left( \frac{u}{v} \right)' = \frac{u'v - uv'}{v^2} \]

Compounding interest: if \$P\$ is invested for \(t\) time periods at an interest rate of \(r\) per period then the final balance \(F\) is given by:

\[ F = P(1 + r)^t \]

Continuously compounding interest: if \$P\$ is invested for \(t\) years at an interest rate of \(r\) per annum, compounding continuously, then the final balance \(F\) is given by:

\[ F = Pe^{rt} \]