Unofficial Past Paper Solutions
COMP206P
Mathematics and Statistics
2011

David Xiao

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This document does not contain the full working out of every solution, and thus what is written here is almost certainly not sufficient to give full marks.
Instead it aims to provide a correct answer for you to be able to check against your own attempts(s).
If you find a mistake, please email the correction (preferably with explanation) to
davidxiao93@gmail.com
Please check www.xiao93.com for the latest version
Good Luck!

Question 1

(a) $r = 13, \theta \approx -1.176rad = -67.4deg$

(b) (-4, 3)

Question 2

(a) $0 \leq x \leq 3$ or $x > 5$

(b) $-2 < x < -1$ or $-1 < x < 1$ (Note $x \neq -1$)

Question 3

(a) $\sqrt{113} - 3$

(b) $\sqrt{\frac{227}{7}}$

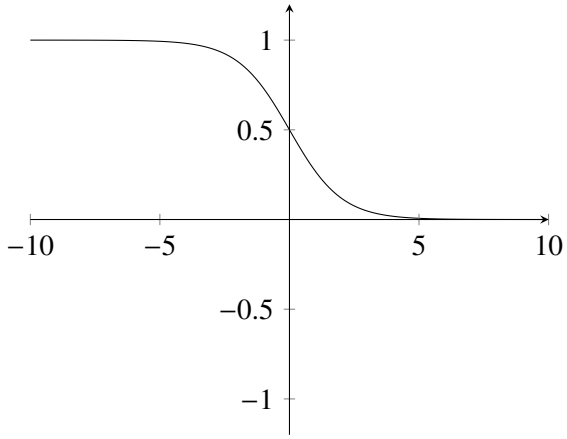
Question 4

(a) $y = \frac{-1}{3}x - \frac{1}{3}$

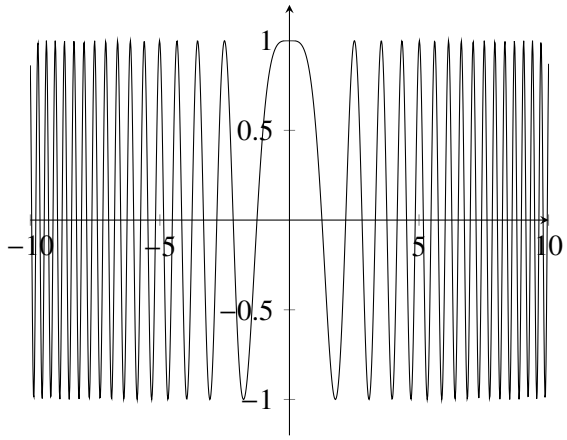
(b) $y + \frac{1}{2}\sqrt{3} = tan(\frac{\pi}{6})(x - \frac{1}{2})$

Question 5

(a) Sketch:



(b) Sketch:



Question 6

(a) Assuming *log* is natural logarithm: $\frac{1}{3+7x^3}21x^2$

(b) Assuming *log* is natural logarithm: $\frac{1}{log(1+x)} + -x \times \frac{1}{log^2(1+x)}$

Question 7

(a) $\frac{d^2}{dx^2} sin(x^2) = 2cos(x^2) - 4x^2 sin(x^2)$.

(b) $\frac{\delta z}{\delta x} = 2x + 3x^2y$

Question 8

(a) $3log(1 + x^2) + c$

(b) $\frac{1}{2e}$

Question 9

(a) $log(1 + x) = \sum_{n=1}^{\infty}((-1)^{n+1}\frac{x^n}{n})$

(b) $1 + x^2 + O(x^4)$

Question 10

(a) Cross product is perpendicular to both vectors. $\{21; -5; 29\}$

(b) A real or complex number x is algebraic if there exists a polynomial with rational coefficients where x is a root of the polynomial. A real or complex number is transcendental if it is not algebraic.

Question 11

(a) Mean is 2.5/15 minutes. Probability of exactly 3 in 15 minutes is 0.2138

(b) $approx$0.435

(c) Geometric. $P(Y = 5) \approx 0.0783$. $P(Y \geq 30) = 0.85^{29}$

(d) ≈ 0.0890

(e) Mean: Âč4,000. Variance: Âč125,000.

(f) Using Central Limit Theorem, we get $P(Z \geq 2.84) \approx 0.00226$

Question 12

(a) $\frac{1}{40}$

(b) $\frac{7}{20}$

(c) $\frac{13}{40}$

(d) Repeats: Mx2, Lx2, Ox3, Rx2, Dx2. $\frac{2!2!2!2!3!}{16!}$

(e) $\frac{1}{3640}$

(f) $\frac{3}{8}$

(g) No. $P(X = 0 \cap Y = 0) \neq P(X = 0) \times P(Y = 0)$

Question 13

(a) ≈ 0.472

(b) (i) Sample mean: 4671.43
Sample standard deviation = 4069.15
Median: 3500
Lower Quartile: 1500
Upper Quartile: 6000

(ii) Assuming that the Central Limit theorem can be applied here
Null hypothesis: Mean is 4000 hours
Alternative hypothesis: Mean is not 4000 hours
$t \approx 0.9762$
Table does not provide the p-values when there are 34 degrees of freedom
Using t-test method instead:
Critical points at ±2.032
Fail to reject Null Hypothesis

(c) (i) ≈ 0.4914

(ii) ≈ 0.2792

Version History

V1.0 Converted to LaTeX format
V1.0.1 Corrected 11d.
V1.1 Corrected 3b, 8a, 9b and clarified 6a, 6b