



Mock Math Provincial Exam 2004
Answer Key

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|-------|-------|
| 1. A | 22. D |
| 2. A | 23. D |
| 3. B | 24. C |
| 4. B | 25. A |
| 5. C | 26. A |
| 6. C | 27. A |
| 7. D | 28. C |
| 8. C | 29. C |
| 9. B | 30. A |
| 10. D | 31. A |
| 11. C | 32. D |
| 12. D | 33. B |
| 13. C | 34. C |
| 14. B | 35. D |
| 15. B | 36. A |
| 16. D | 37. A |
| 17. B | 38. B |
| 18. A | 39. A |
| 19. B | 40. D |
| 20. C | 41. C |
| 21. D | 42. B |

1. a.) A theatre company of 14 actors consists of 8 men and 6 women. How many different ways are there to choose from the theatre company a group of 8 with exactly 3 men? **(2 marks)**

$$\begin{aligned} &= {}_8C_3 {}_6C_5 \\ &= (56)(6) \\ &= 336 \end{aligned}$$

- b) A theatre company of 14 actors consists of 8 men and 6 women. How many different ways are there to choose from the theatre company a group of 8 with at least 4 women? **(2 marks)**

$$\begin{aligned} &= {}_8C_2 {}_6C_4 + {}_8C_1 {}_6C_5 + {}_8C_0 {}_6C_6 \\ &= (28)(15) + (8)(6) + (1)(1) \\ &= 420 + 48 + 1 \\ &= 469 \end{aligned}$$

2. Solve algebraically, giving exact values, where $0 \leq x < 2\pi$. (4 marks)

$$2 \tan x \cos x - \tan x = 0$$

$$\tan x (2 \cos x - 1) = 0$$

$$\tan x = 0$$

$$\text{or} \quad 2 \cos x - 1 = 0$$

$$x = 0$$

$$\cos x = \frac{1}{2}$$

$$x = \frac{\pi}{2}$$

$$x = \frac{\pi}{3}$$

$$x = \frac{5\pi}{3}$$

3. Solve algebraically: $\log_2 x + \log_2(x-7) = 3$ (5 marks)

$$\log_2(x)(x-7) = 3$$

$$(x)(x-7) = 2^3$$

$$x^2 - 7x = 8$$

$$x^2 - 7x - 8 = 0$$

$$(x-8)(x+1) = 0$$

$$x = 8 \text{ or } x = -1$$

(reject)

4a.) Change to standard form: $4y^2 + 16y - 9x^2 + 18x - 29 = 0$
(4 marks)

$$9x^2 - 18x - 4y^2 - 16y = -29$$

$$9(x^2 - 2x) - 4(y^2 + 4y) = -29$$

$$9(x^2 - 2x + 1) - 4(y^2 + 4y + 4) = -29 + 1(9) + 4(-4)$$

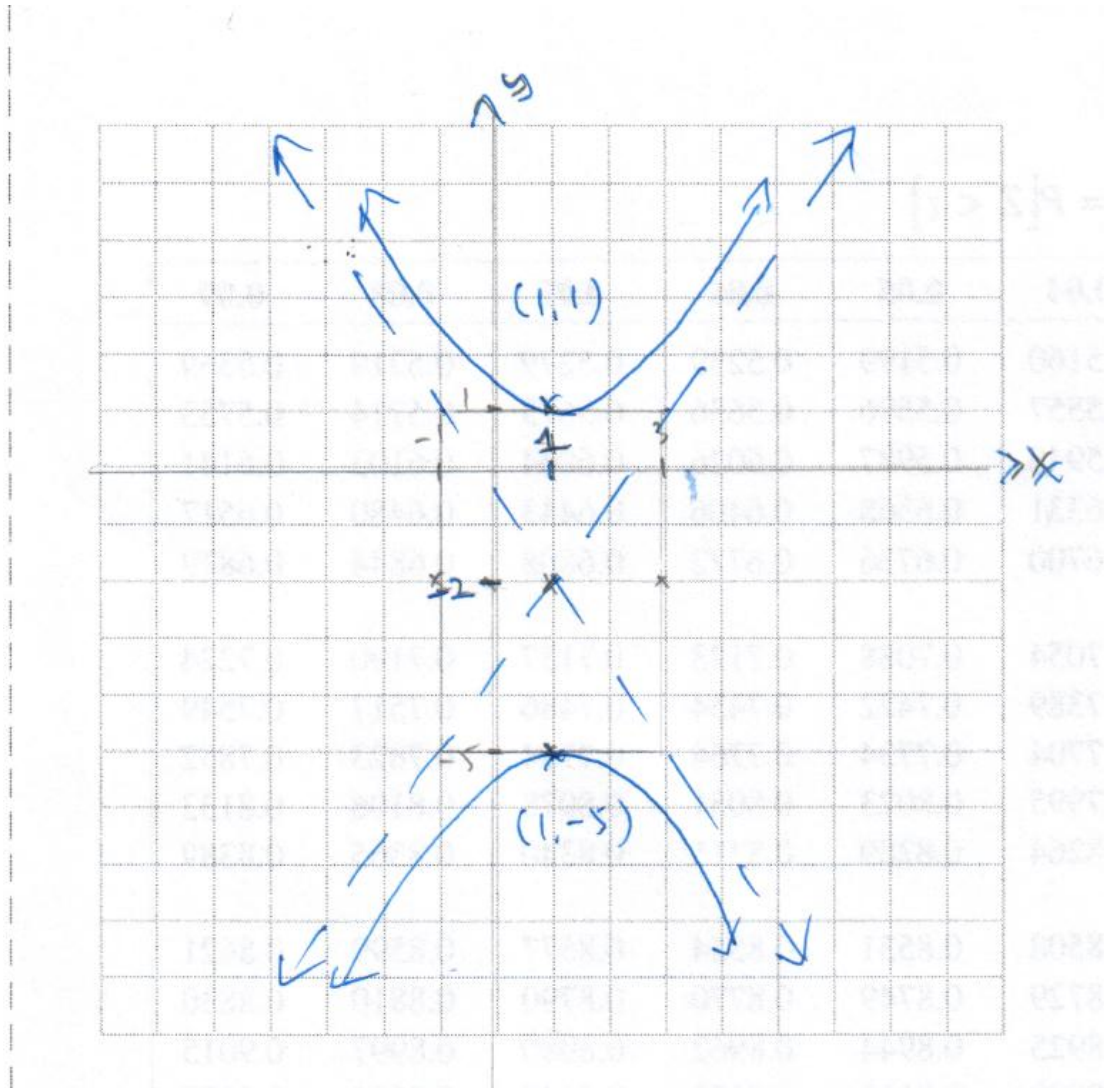
$$9(x-1)^2 - 4(y+2)^2 = -29 + 9 - 16$$

$$9(x-1)^2 - 4(y+2)^2 = -36$$

$$\frac{(x-1)^2}{4} - \frac{(y+2)^2}{9} = -1$$

b.) graph $4y^2 + 16y - 9x^2 + 18x - 29 = 0$ (2 marks)

Graph: $\frac{(x-1)^2}{4} - \frac{(y+2)^2}{9} = -1$



5. In a large city in BC the probability that a car has air conditioning is 0.72. If 300 cars are randomly selected, determine the probability that between 210 to 212 cars inclusive have air conditioning by using the following methods.

- a. Use the binomial distribution to obtain this probability.
(Answer accurate to at least 4 decimal places.) **(2 marks)**

$$P=0.72 \quad n=300$$

$$\begin{aligned} &P(210 \leq X \leq 212) \\ &= \text{binompdf}(300, 0.72, 210) + \text{binompdf}(300, 0.72, 211) \\ &\quad + \text{binompdf}(300, 0.72, 212) \\ &= 0.0374 + 0.0411 + 0.0443 \\ &= 0.1228 \end{aligned}$$

- b. Use the normal approximation to the binomial distribution to obtain an estimate of this probability. (Answer accurate to at least 4 decimal places.) **(2 marks)**

$$\mu = np = (300)(0.72) = 216$$

$$\sigma = \sqrt{npq} = \sqrt{(300)(0.72)(0.28)} = 7.78$$

$$\begin{aligned} &P(210 \leq X \leq 212) \\ &= \text{normalcdf}(209.5, 212.5, 216, 7.78) \\ &= 0.1247 \end{aligned}$$

6. Prove the identity:

(4 marks)

$$\cot \theta - \cos 2\theta \cot \theta = \sin 2\theta$$

$\cot \theta (1 - \cos 2\theta)$ $\cot \theta [1 - (1 - \sin^2 \theta)]$ $\cot (1 - 1 + 2 \sin^2 \theta)$ $\frac{\cos \theta}{\sin \theta} 2 \sin^2 \theta$ $2 \cos \theta \sin \theta$ $\sin 2\theta$	= R.H.S.
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