Mock Math Provincial Exam 2005A
Answer Key

1.	C	22.	D
2.	B	23.	B
3.	C	24.	C
4.	A	25.	D
5.	D	26.	D
6.	B	27.	A or D
7.	A	28.	A
8.	C	29.	A
9.	B	30.	A
10.	D	31.	B
11.	C	32.	D
12.	A	33.	B
13.	C	34.	D
14.	C	35.	B
15.	B	36.	D
16.	C	37.	D
		38.	D
Section II		39.	D
17.	C	40.	A
18.	C	41.	B
19.	B	42.	B
20.	A	43.	B
21.	A	44.	A

1. The population of a nest of bees can multiple threefold (triple) in 10 weeks. If the population is now 13000, how many weeks will it take for the population to reach 50000 bees? (Solve algebraically using logarithms. Answer accurate to at least 2 decimal places.)

(4 marks)

$$50,000 = 13,000(3)^{\frac{t}{10}}$$

$$\frac{50}{13} = 3^{\frac{t}{10}}$$

$$\log(\frac{50}{13}) = \frac{t}{10}\log 3$$

$$\frac{10*\log(50/13)}{\log 3} = t$$

$$12.26 = t$$

2. The circle with equation $x^2 + 8x + y^2 + 4y = 0$ is translated 2 units to the right to form a new circle. Determine the equation of the new circle and change to standard form. (**4 marks**)

$$(x^2 + 8x + 4^2) + (y^2 + 4y + 2^2) = +16 + 4$$
$$(x+4)^2 + (y+2)^2 = 20$$
$$(x+2)^2 + (y+2)^2 = 20$$

3. A sinusoidal curve has a minimum point at $(-\frac{\pi}{2}, -5)$ and the closest maximum point to the right is $(\frac{\pi}{3}, 3)$. Determine an equation of this curve. **(4 marks)**

$y = 4\cos\frac{6}{5}(x - \frac{\pi}{3}) - 1$

or

$y = -4\cos\frac{6}{5}(x + \frac{\pi}{2}) - 1$

4. a.) Picking 5 cards from a deck of card, what is the probability to obtain exactly 3 Kings'?

(2 marks)

$$\frac{(_4C_3)(_{48}C_2)}{(_{52}C_5)} = 0.0017$$

b.) Picking 5 cards from a deck of card, what's the probability to obtain at least 3 Kings'?

(2 marks)

$$\frac{(_4C_3)(_{48}C_2)}{(_{52}C_5)} + \frac{(_4C_4)(_{48}C_1)}{(_{52}C_5)} = 0.0018$$

5. In BC, the probability that a student can go to any post-secondary institution is 0.60. If 500 students are randomly selected, determine the probability that between 200 and 202 students inclusive can attend any post-secondary institution by using the following methods.

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

$sum(binopdf\,(300, 0.6, \{200, 201, 202\}))$

$= 0.0065$

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)**

$\mu = np = (300)(0.6) = 180$

$\sigma = \sqrt{(npq)} = \sqrt{(300)(0.6)(0.4)} = \sqrt{72}$

$normalcdf\,(199.5, 202.5, 180, \sqrt{72})$

$= 0.0068$

6. Prove the identities: **(4 marks)**

$$\cot^2 \theta \sin 2\theta + \sin 2\theta = 2\cos \theta$$

$\sin 2\theta(\cot^2 \theta + 1)$

$2\sin \theta \cos \theta(\csc^2 \theta)$

$\dfrac{2\sin \theta \cos \theta}{\sin^2 \theta}$

$\dfrac{2\cos \theta}{\sin \theta}$

$\cot \theta$

$= RS$