NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2010

MATHEMATICS: PAPER I

EXAMINATION NUMBER

Time: 3 hours 150 marks

ANSWER SHEET

QUESTION 5

(a) Given $p(x) = -3x^2$

Determine the equation of the inverse of p stating its domain and range.

(5)

(b) Given $f(x) = 2^x$, $g(x) = f(x-2)$ and $h(x) = f^{-1}(x)$

(1) Write down the equations of g and h in the form $y = \ldots$

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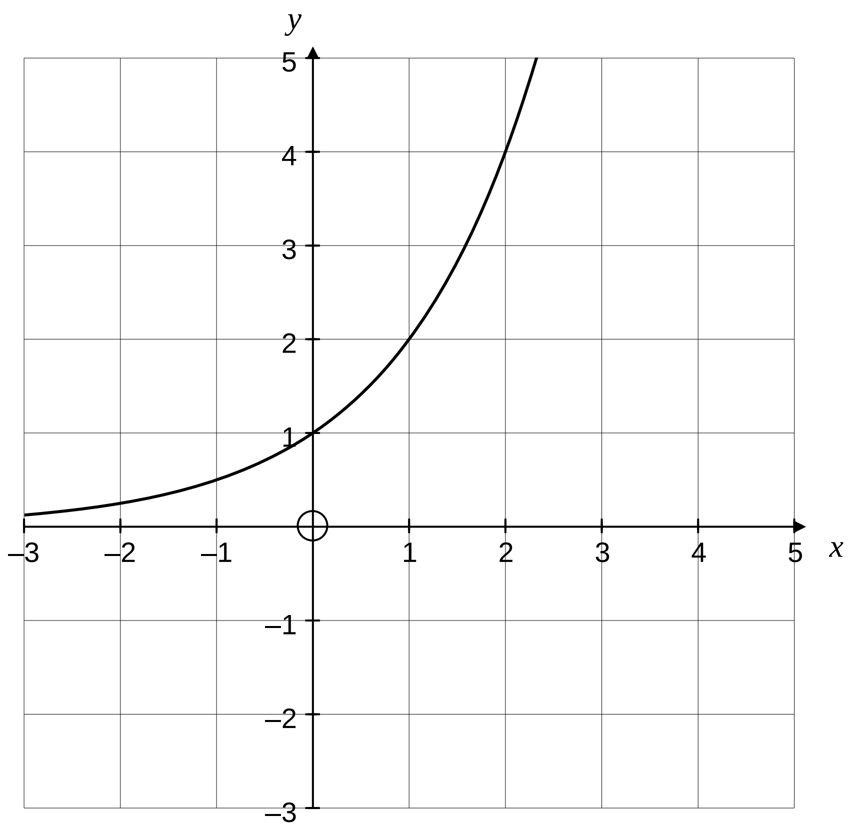
____ (2)

(2) On the set of axes where f is already drawn for you, add the graphs for g and h. Label your graphs clearly.



(4)

(3) Solve for x if $g(x) = h(x)$.

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____ (1)

[12]

INFORMATION SHEET

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

$$\sum_{i=1}^{n} 1 = n \qquad \sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

$$\sum_{i=1}^{n} \left[a + (i-1)d \right] = \frac{n}{2}\left[2a + (n-1)d \right]$$

$$\sum_{i=1}^{n} ar^{i-1} = \frac{a(r^n - 1)}{r-1} \; ; \quad r \neq 1 \qquad \sum_{i=1}^{\infty} ar^{i-1} = \frac{a}{1-r} ; \; -1 < r < 1, \; r \neq 0$$

$$T_n = an^2 + bn + c$$

$$T_n = T_1 + (n-1)f + \frac{(n-1)(n-2)}{2}s$$

where f is the first term of the first difference and s is the second difference

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$A = P(1 + ni) \qquad A = P(1 - ni)$$

$$A = P(1 + i)^n \qquad A = P(1 - i)^n$$

$$F = x\left[\frac{(1+i)^n - 1}{i}\right] \qquad P = x\left[\frac{1 - (1+i)^{-n}}{i}\right]$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad M\left(\frac{x_1 + x_2}{2} \; ; \; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

In ΔABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

d

$$a^2 = b^2 + c^2 - 2bc.\cos A$$

$$area\ \Delta ABC = \frac{1}{2}ab.\sin C$$

$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$

$\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$

$\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases}$$

$\sin 2\alpha = 2\sin\alpha.\cos\alpha$

$$(x\ ;\ y) = ((x_A\cos\alpha - y_A\sin\alpha)\ ;\ (y_A\cos\alpha + x_A\sin\alpha))$$

$\bar{x} = \dfrac{\sum x}{n}$

$\bar{x} = \dfrac{\sum f\,x}{n}$

$\text{var} = \dfrac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$

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$$\text{s.d.} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A\ or\ B) = P(A) + P(B) - P(A\ and\ B)$$