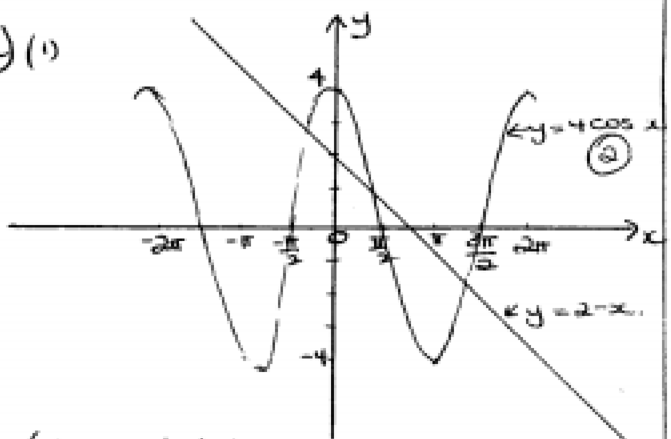
SOLUTIONS

EXTENSION 1 ASSESSMENT
December, 2001

Question 1

Solution		Comment
a) $\cos\frac{\pi}{6} - \cos\frac{7\pi}{6} = \frac{\sqrt{3}}{2} - -\frac{\sqrt{3}}{2} = \sqrt{3}$.	1	Exact values must be known!
b) $\frac{d}{dx}\, x\sin x = x\cos x + \sin x$	1	Some did not recognise that the product rule was req'd.
c) $12 = 2r + r\theta = r(2+\theta)$, $r = \frac{12}{2+\theta}$	1	Some did not make 'r' the subject.
Area sector ABC $= \frac{1}{2}r^2\theta = \frac{1}{2}\left(\frac{12}{2+\theta}\right)^2\theta = \frac{72\theta}{(2+\theta)^2}$	1	
d) (i) 	2	Cos graph generally well done, but line graph not accurate enough (by some)
(ii) $-4 \le 4\cos x \le 4$, $-4 \le 2-x \le 4$, ie $-2 \le x \le 6$.	1	Saying 'it is obvious from the graph' was not adequat exporation.

Question 2

a) $$\int_0^1 (2x-1)^4\,dx = \left[\frac{(2x-1)^5}{5\times 2}\right]_0^1 \quad (1)$$

$$= \frac{1}{10} - -\frac{1}{10} \quad (1)$$

$$= \frac{1}{5}.$$

b) $y = 4^x$

x	0	0.5	1
y	1	2	4

$$\int_0^1 4^x\,dx \doteq \frac{1-0}{6}\left[1 + 4\times 2 + 4\right] \quad (2)$$

$$= \frac{13}{6}.$$

c) $$V = \pi\int_0^2 y^2\,dx \quad (3)$$

$$= \pi\int_0^2 4x^2 + x^4 - 4x^3\,dx.$$

$$= \pi\left[\frac{4x^3}{3} + \frac{x^5}{5} - x^4\right]_0^2$$

$$= \pi\left(\frac{32}{3} + \frac{32}{5} - 16\right)$$

$$= \frac{16\pi}{15} \text{ cubic units.}$$

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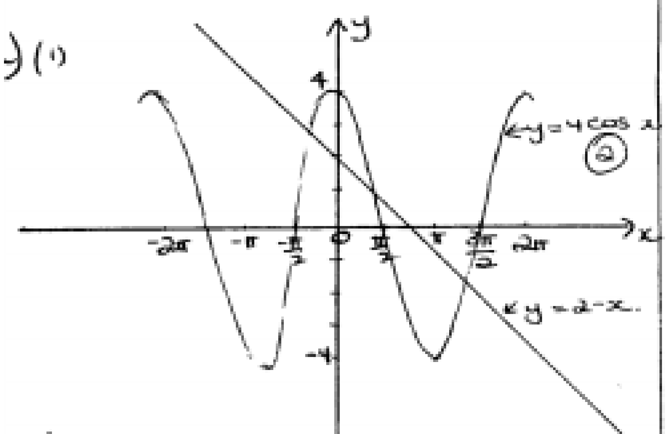
Question 1		
$\cos\frac{\pi}{6} - \cos\frac{7\pi}{6} = \frac{\sqrt{3}}{2} - -\frac{\sqrt{3}}{2}$ $= \sqrt{3}$.	(1)	Exact values must be known!
$\frac{d}{dx}\, x\sin x = x\cos x + \sin x$	(1)	Some did not recognise that the product rule was req'd.
$12 = 2r + r\theta$ $= r(2+\theta)$ $r = \frac{12}{2+\theta}$	(1)	Some did not make 'r' the subject.
Area sector ABC $= \frac{1}{2}r^2\theta$ $= \frac{1}{2}\left(\frac{12}{2+\theta}\right)^2\theta$ $= \frac{72\theta}{(2+\theta)^2}$	(1)	
(i) 	(2)	Cos graph generally well done, but line graph not accurate enough (by some)
(ii) $-4 \le 4\cos x \le 4$ $-4 \le 2 - x \le 4$ i.e. $-2 \le x \le 6$.	(1)	Saying 'it is obvious from the graph' was not adequate explanation.

		COMMENT
a) $\int_0^1 (2x-1)^4\,dx = \left[\frac{(2x-1)^5}{5\times 2}\right]_0^1$	(1)	• finding the antiderivative [illegible]
$= \frac{1}{10} - -\frac{1}{10}$ $= \frac{1}{5}$.	(1)	• [illegible] • evaluate [illegible]
b) $y = 4^x$ x: 0, 0.5, 1 y: 1, 2, 4 $\int_0^1 4^x\,dx \doteq \frac{1-0}{6}\left[1 + 4\times 2 + 4\right]$ $= \frac{13}{6}$.	(2)	• care with Simpson's rule — [illegible] • make a table of values correct!
c) $V = \pi\int_0^2 y^2\,dx$ $= \pi\int_0^2 4x^2 + x^4 - 4x^3\,dx$. $= \pi\left[\frac{4x^3}{3} + \frac{x^5}{5} - x^4\right]_0^2$ $= \pi\left(\frac{32}{3} + \frac{32}{5} - 16\right)$ $= \frac{16\pi}{15}$ cubic units.	(3)	• expand first, don't try [illegible] integration • leave answers with π as improper fractions