A2 Assignment beta Cover Sheet **Name:**

Question		Done	Backpack		Topic	Comment
Drill	1i				C3 Differentiation trig	$4\sec^2 2x\tan 2x$
	1ii				C3 Differentiation trig	$-6\cot 3x\operatorname{cosec}^2 3x$
	1iii				C3 Differentiation trig	$-2\operatorname{cosec}^2 x\cot x$
	2i				C4 Integration Reverse chain	$\frac{1}{16}(4x-3)^4+c$
	2ii				C4 Integration Reverse chain	$\frac{1}{5}\sin(5x+4)+c$
	2iii				C4 Integration Reverse chain	$\frac{1}{4}\cos(3-4x)+c$
	3i				C2 Log evaluation	-2
	3ii				C2 Log evaluation	3
	3iii				C2 Log evaluation	1/3
	4i				C4 Integration Reverse chain	$\frac{1}{3}\sec 3x+c$
	4ii				C4 Integration Reverse chain	$(b)-\cos ecx+c$
	4iii				C4 Integration Reverse chain	$\frac{1}{2}\tan 2x+c$
Consolidation	1a				C3 Differentiation all & factorising to simplify	$2\sec 7x(7\cos x\tan 7x-\sin x)$
	1b				C3 Differentiation all & factorising to simplify	0
	1c				C3 Differentiation all & factorising to simplify	$\frac{2x^2+1}{\sqrt{x^2+1}}$
	2				C3 Find normal	$x=\frac{\pi}{2}$
	3a				C4 Finding dy/dx from dx/dy	$\cos^2 y$
	3b				C4 Finding dy/dx from dx/dy	$1\big/y^2(3\sin y+y\cos y)$
	3c				C4 Finding dy/dx from dx/dy	$\frac{\cos y}{3(1+y\tan y)}$
	4a				C2 Solving trig equations	$\frac{\pi}{12},\frac{7\pi}{12},\frac{13\pi}{12},\frac{19\pi}{12}$
	4b				C2 Solving trig equations	0.322^c, 3.46^c, 2.82^c, 5.96^c
	5a				C3 Proving trig identities	PROOF
	5b				C3 Proving trig identities	PROOF
	6				C3 Find normal	PROOF
	7				C3 Differentiation & factorising to simplify	PROOF
	8				C3 Algebraic division	$A=2$, $B=-4$, $C=6$, $D=-11$

	9				C3 differentiation	8
M1 Practice	10				M1 Impulse	0.4Ns , $6.33\ ms^{-1}$
Challenge					C2 Differentiation	PROOF

α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	o	π	ρ	σ	τ	υ	φ	χ	ψ	ω

"It is a mathematical fact that the casting of this pebble from my hand alters the centre of gravity of the universe." T Carlyle

A2 Maths with Mechanics Assignment β (beta)

due w/b 2/10 and do corrections to the CWC test

Drill

Part A Differentiate the following functions with respect to x:

(a) $f(x) = \sec^2 2x$ (b) $f(x) = \cot^2 3x$ (c) $f(x) = \operatorname{cosec}^2 x$

Part B Find the following integrals by considering what has been differentiated

(a) $\int (4x-3)^3 dx$ (b) $\int \cos(5x+4)dx$ (c) $\int \sin(3-4x)dx$

Part C Find the exact values of the following

(a) $\log_3 \frac{1}{9}$ (b) $-\log_2 \frac{1}{8}$ (c) $\log_8 2$

Part D Find the following integrals by considering what has been differentiated

$(a)\int \sec 3x \tan 3x dx$ (b) $\int \cos ecx \cot x dx$ (c) $\int \sec^2 2x dx$

1. Differentiate the following using the correct notation:

   (a) f(x) = $2\cos x \sec 7x$ (b) f(x) = $\tan 2x \cot 2x$ (c) $y = x\sqrt{x^2+1}$

2. Find the equation of the normal to $y = \operatorname{cosec} x$ at the point where $(\frac{\pi}{2},1)$

3. Find $\frac{dy}{dx}$, in terms of y, given that

   (a) $x = \tan y$ (b) $x = y^3 \sin y$ (c) $x = 3y\sec y$

4. Solve the following equations in the interval $0 \le \theta \le 2\pi$. Give exact answers where you can, but otherwise give your answers to 3sf:

   (a) $\sqrt{3}\sin 2\theta + 2\sin^2\theta = 1$ (b) $4\tan 2\theta \tan\theta = 1$

5. Prove the following identities:

(a) $\sec x + \tan x \equiv \dfrac{1}{\sec x - \tan x}$ (b) $\cos(90^o - x) \equiv \sin x$

6. The maximum point on the curve with equation $y = x\sqrt{\sin x}$ where $0 < x < \pi$ is A. Show that the x coordinate of A satisfies the equation $2\tan x + x = 0$.

7. Show that $\dfrac{d}{dx}\left[\dfrac{1+\cot x}{1-\cot x}\right] = -2\left(\dfrac{\operatorname{cosec} x}{1-\cot x}\right)^2$

8. Show that $\dfrac{4x^3 - 6x^2 + 8x - 5}{2x+1}$ can be written in the form $Ax^2 + Bx + C + \dfrac{D}{2x+1}$ where A, B, C and D are constants to be found.

9. Find the value of dy/dx at the point (0,3) on the curve $y = (2x + 3)e^{2x}$

M1 Practice (Preparation for M2)

10. Two uniform smooth spheres, A of mass 0.03kg and B of mass 0.1kg, have equal radii and are moving directly towards each other with speeds of 7 ms^{-1} and 4ms^{-1} respectively. The spheres collide directly and B is reduced to rest by the impact. State the magnitude of the impulse experienced by B, and find the speed of A after impact.

This question is designed to fully test your understanding!

Challenge yourself and give it your best shot:-

The function *f(x)* is given by:

$f(x) = e^{mx}(x^2 + x)$, $x \in \mathbf{R}$, where m is a non-zero constant

Show that *f(x)* has two stationary points, for all non-zero values of m.