PERTH COLLEGE
YR 12 3CD SPECIALIST MATHEMATICS
SEMESTER ONE 2010
TEST 2

Name: **Time : 50 mins** **Total marks :** **/45 =** **%**

- Answer all questions neatly in the spaces provided.
- **Show all working** where appropriate.
- **Calculator & Formula Sheet allowed**

1) (3, 3 marks)

If $x = 3t^2 + 4t$ and $y = \frac{1}{t+1}$ find

a) $\frac{dy}{dx}$ in terms of t ,

b) $\frac{d^2y}{dx^2}$ in terms of t

2) (2, 3, 3, 4, 6 marks)

Determine the following integrals. Show appropriate working for **full marks.**

a) $\int 3x^2 + \sin \pi x \; dx$

b) $\int \frac{5x^2 - 3x}{\sqrt{x}} \; dx$

c) $\int 6x^2 \sqrt{(1 + x^3)} \; dx$

d) $\int \cos^2 x \sin^3 x \, dx$

e) $\int \sin^4 x \ dx$

3) (5, 5 marks)

Perform the following integrations **<u>using the given substitutions</u>**. Show all working.

a) $\int \frac{4x}{\sqrt{4 - x^2}}\, dx$ let x = 2 sin θ

b) $\int \frac{4x}{\sqrt{x - 3}}\, dx$ let u = x – 3

4) (4 marks)

The equation of the gradient to a curve is given by

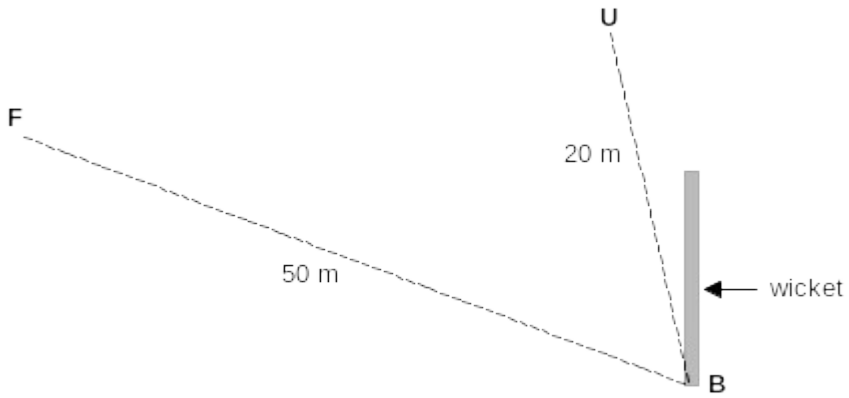
$g'(x) = 4 + \frac{3}{x^2} + 2\pi\cos\pi x$

If the point (1,2) lies on the curve, find the equation of g(x)

5) (7 marks)

In a cricket match, a ball is hit from B at a constant speed of 30 ms^{-1} towards a fieldsperson at F, located 50 metres from B along the bearing 290°.
An umpire is standing at U, 20 metres from B along bearing 350° .

Determine how fast the distance between the ball and the umpire is changing when the ball has travelled half-way towards the fieldsperson. Assume that the fieldsperson and the umpire have not moved from their respective positions.



NOT DRAWN TO SCALE