MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 3 - 2016
Integration and the Binomial Distribution

Resource Rich

Name: _____ **Teacher:** _____

Marks: **53**

Time Allowed: **30 minutes**

Instructions: You are allowed to use Calculators and have 1 page of notes (2 sides).

You have been supplied with a formula sheet.

1 The probability that a person currently in an Australian high security prison for committing a serious crime will reoffend within three years of release is known to be 0.68. Ten prisoners are randomly selected from a high security prison. Find the probability that at least four will reoffend within three years of their release.

[4 marks]

2 A binomial variable, X, has the probability function:

$P(X = x) = \binom{6}{x}(0.45)^x(0.55)^{6-x}$.

Find:

a the number of trials

b the probability of success in any trial

c the probability distribution as a table.

[1,2,3=6 marks]

Additional Working Space

8 Find y in terms of x if $\frac{dy}{dx} = 8x - 7$ and $y = 13$ when $x = -1$.

[3 marks]

9 Find the area under the curve $y = x^2 - 4x - 12$ from $x = -1$ to $x = 4$.

[4 marks]

10 Fluid flows into a storage tank at the rate

$F'(t) = 100e^{0.2t}$ litres/h

where t is measured in hours.

How much fluid, to the nearest litre, will flow into the tank in the first 3 hours?

[4 marks]

*****END OF RR TEST*****

3 A keen archer knows that she scores a bullseye one in every four shots.

a If she has 7 shots at the target, what is the probability she hits the bullseye at least twice?

b How many shots will she need to take in order to ensure a probability of more than 0.9 of scoring at least one bullseye?

[2,3 = 5 marks]

4 Evaluate each of the following definite integrals:

a $\int_1^3 (2x - 9)dx$

b $\int_2^6 e^x dx$

c $\int_0^{\pi} \cos(x)dx$

d $\int_{-2}^{1} (x^2 - 3x + 5)dx$

[3,3,3,3=12 marks]

5 **a** Evaluate $\int_{-3}^{3} 2x^3 dx$.

b Find the area enclosed between the curve $y = 2x^3$ and the x-axis between $x = -3$ and $x = 3$.

[2,4=6 marks]

6 Evaluate:

$$\int_0^1 (5x^3 - 2x^2 + x - 2)dx - \int_0^1 (x^3 - 5x^2 + 4)dx$$

[3 marks]

7 Evaluate the following:

a $\int_{-1}^{3} (6x^2 + 4x - 1)dx$

b $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} 6\cos(3x)dx$

c $\int_2^5 \frac{dx}{(x+3)^2}$

[2,2,2=6 marks]