**MATH 3B - MIDTERM 2.2 - 25 FEB 2009**

Name: _____ TARDIS code: [ ]

Signature: _____

**Put [final answer] in answer boxes on this page.**
**Blue book should show your name, TARDIS code and WORK for all problems.**
**Unexplained correct answers may be ignored. Simplify where clearly possible.**

(1) Consider the region $S$ that lies between the three curves

$$y = \arccos x, \quad x = 0 \quad \text{and} \quad y = \tfrac{\pi}{3}$$

A crude sketch appears on the right ⇒
Calculate the area of $S$. (Hint: Try to avoid integrating $\arccos x$.)

Area =

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(2) Using the cylindrical shell method, find the resulting volume if the region between the three curves $y = \cos x$, $y = 0$ and $x = \frac{\pi}{3}$ is rotated around the $y$-axis.

First write down the appropriate integral: $\int$

Then solve the integral: Volume =

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(3) A reluctant burro is pulled along a path by a man who must exert a force of

$$10/(1+x)^2$$

pounds when the burro is a distance x feet from the beginning of the path. How much work does he need to do to move the burro 4 feet down the path? First write down the appropriate integral: $\int$

Then solve the integral: Work =

(4) On the planet PsK! the standard unit of length is the gronka, abbreviated *gr*. Acceleration due to gravity is always 20 gronkas/sec$^2$. A ball is dropped from the top of a very tall tower.

- What will the velocity of the ball be after $t$ seconds? $\boxed{\quad\quad gr/sec}$
- How far will the ball have dropped after $t$ seconds? $\boxed{\quad\quad gr}$
- What will the velocity be when the ball has dropped $r$ gronkas? $\boxed{\quad\quad gr/sec}$
- What is the average velocity of the ball over the first 5 gronkas? $\boxed{\quad\quad gr/sec}$

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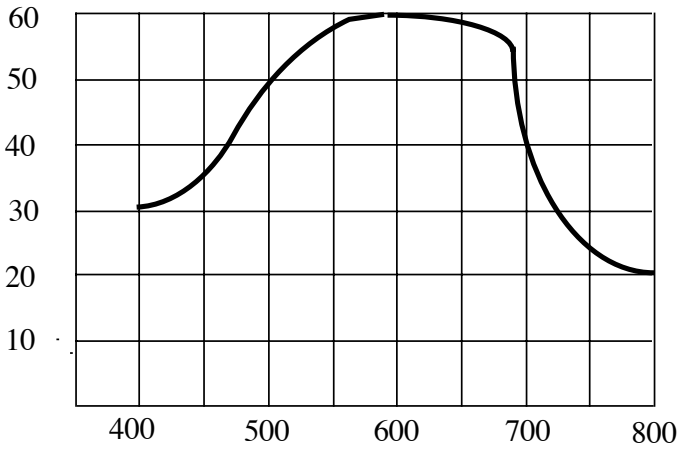


FIGURE 1. Elbonian SAT's

(5) The huge City University of Elbonia admits anyone with a Math SAT of 400 or over. Here is a graph of the number of students admitted for each SAT score between 400 and 800 (a perfect score). For example, according to the graph, about 57 students had a Math SAT of 635. Using $n = 4$ on the interval $[400, 800]$ estimate the total number of students admitted

- Using the Trapezoidal rule: $\boxed{\quad\quad}$
- Using Simpson's rule: $\boxed{\quad\quad}$