YOUR NAME:

OFFICE USE ONLY:

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| PTS. | | | | | |

TOTAL SCORE

# MATH 217 MIDTERM - MARCH 13, 2003

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1. Find the following antiderivatives:

$$\text{(a)} \int 4x^{3/4}dx; \ \text{(b)} \int x^2(x^3 - 2x)dx.$$

(c) Solve $\frac{dy}{dx} = x^{-2} + 2$ if $y = 2$ at $x = 1$.

2. Sketch the function $y = |t|$ (using $t$ and $y$ axes).

Give an expression in terms of $x$ for the area between the curve $y = |t|$ and the lines $t = -1, y = 0$, and $t = x$. Indicate this area on your graph above. Evaluate this as a simple function of $x$.

If $G(x) = \int_1^x cos^3(2t)dt$, what is $G'(x)$?

3. Evaluate (a) $\int_1^2 \frac{s^3-8}{s^2} ds$,

(b) $\int_0^1 \frac{x^2}{(2-x^3)^{3/2}} dx$.

4. Sketch the region $R$ bounded by the curve $y = x^2$ and the lines $y = 0$ and $x = 2$.

Compute the area of this region.

Suppose $R$ is revolved about the $x$-axis. What is the volume of the object we obtain?

5. Sketch the curve given parametrically by $x = 3t^2, y = 2t^3$ for $0 \leq t \leq 1$.

Give a formula for the length of this curve and compute this definite integral to get an exact value for the length.

You may freely use the following formulae and facts. Some of these will not be needed, and some formulae and facts will be needed that are not given here - those will be more standard and things you are expected to know already.

Acceleration due to gravity is 32 feet per second squared.
The area of a circle of radius $r$ is $\pi r^2$; its circumference is $2\pi r$.
The area of a triangle with base $b$ and height $h$ is $\frac{1}{2}bh$.
The volume of a cylinder of height $h$ and radius $r$ is $\pi r^2 h$.
The volume of a cone of height $h$ and radius $r$ is $\frac{1}{3}\pi r^2 h$.
The volume of a sphere of radius $r$ is $\frac{4}{3}\pi r^3$; its surface area is $4\pi r^2$.
Pythagoras's theorem: $a^2 + b^2 = c^2$, where $a, b, c$ are the sides of a right triangle with $c$ the hypotenuse.
The circle with center the origin and radius $r$ has equation $x^2 + y^2 = r^2$.
$tan(t) = \frac{sin(t)}{cos(t)}, cot(t) = \frac{cos(t)}{sin(t)}, sec(t) = \frac{1}{cos(t)}, csc(t) = \frac{1}{sin(t)}$.
$sin(2t) = 2sin(t)cos(t), cos(2t) = cos^2 t - sin^2 t, cos^2 t + sin^2 t = 1, sin(\frac{t}{2}) = \pm\sqrt{\frac{1-cos(t)}{2}}, cos(\frac{t}{2}) = \pm\sqrt{\frac{1+cos(t)}{2}}$.
$sin(0) = 0 = cos(\frac{\pi}{2}), cos(0) = 1 = sin(\frac{\pi}{2}), sin(\frac{\pi}{6}) = \frac{1}{2} = cos(\frac{\pi}{3}), sin(\frac{\pi}{4}) = \frac{\sqrt{2}}{2} = cos(\frac{\pi}{4}), sin(\frac{\pi}{3}) = \frac{\sqrt{3}}{2} = cos(\frac{\pi}{6})$.
If $a \neq 0$, then the roots of $ax^2 + bx + c = 0$ are $x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$.
$a^m a^n = a^{m+n}, \frac{a^m}{a^n} = a^{m-n}, (a^m)^n = a^{mn}, a^{-n} = 1/a^n$.