MATH 1000, Slot F05

Worksheet 10

This is a Practice Worksheet only. It is Not to be handed in.

The Final Exam is on Monday Dec 14 at 12 noon. Students in this section write in the gym in the Phys Ed Building, Room PE 2000. **Be prepared to show your photo ID.** Other than your calculator, **do not** bring electronic devices into the exam room. So, no computer, cellphone, pager, iPod, text messager, etc.

- 1. A cylindrical can (like a Pepsi or Coke can) is made to contain $V \text{ cm}^3$ of liquid. If the metal costs d be square cm, show that the radius of the can that is cheapest to make is $\left(\frac{V}{2\pi}\right)^{\frac{1}{3}}$.
- 2. Find each of the following indefinite integrals.

(a)
$$\int \frac{3x^4 - 5}{4x^5} dx$$

(b)
$$\int \frac{1}{e^{4x}} - \sin(3 - 2x) dx$$

(c)
$$\int \frac{12}{\sqrt{1 - 4t}} dt$$

(d)
$$\int \frac{12}{1 - 4t} dt$$

(e)
$$\int t^2 (1 - t^4) dt$$

(f)
$$\int \frac{1}{(5 + 4x)^3} dx$$

(g)
$$\int \csc \theta (\csc \theta + \cot \theta) d\theta$$

3. Solve the differential equation

$$f''(x) = 3e^{2x} + \sin(2x), \ f(0) = 1, \ f'(0) = 2.$$

4. Evaluate each of the following definite integrals using the **Fundamental Theorem** of the Calculus.

(a)
$$\int_{-2}^{3} (5+x-6x^2) dx$$
 (b) $\int_{-6}^{-1} 8 dx$
(c) $\int_{1}^{4} \sqrt{16t^5} dt$ (d) $\int_{-2}^{-1} \frac{(4-3x)^2}{x^3} dx$
(e) $\int_{0}^{3} \frac{8}{4x+3} dx$ (f) $\int_{0}^{\ln 2} \frac{e^{6x}-4}{e^{2x}} dx$

(g)
$$\int_0^1 \frac{u^2 - u - 2}{u - 2} du$$
 (h) $\int_0^2 \sin(\frac{3x}{2}) dx$