

PRACTICE TEST #4

December 3, 2002

Problem #1.

- i) State the Fundamental Theorem of Calculus.
- ii) Define an anti-derivative of a continuous function.
- iii) Compute an anti-derivative of $\sin(x)$, $\sec^2(x)$, and $\frac{x}{(1+x^2)^3}$.

Problem #2. Differentiate the following functions and explain precisely which concepts from class and/or the text you are using.

$$f(x) = \int_3^{\sin^2(x)} (1+s^3)^{\frac{1}{3}} ds$$

$$h(x) = \int_{x^5}^{\tan(x)} \frac{1+t^2}{5+t^4} dt$$

Problem #3. State the substitution rule and use it to compute the following integrals.

$$\int_0^{\frac{\pi}{4}} \sin^2(u) \cos(u) du$$

$$\int_1^3 \frac{h^2}{(5+2h^3)^2} dh$$

Problem #4. Verify that the volume of a cone of radius r and height h is $\frac{1}{3}\pi r^2 h$.

Problem #5. Compute the area bounded by the following curves:

- i) $y = |x|$, $y = x^2 - 2$.
- ii) $y = \sin(x)$, $y = \sin(2x)$, $x = 0$, $x = \frac{\pi}{2}$.