PRACTICE TEST #4

December 3, 2002

Problem #1.

i) State the Fundamental Theorem of Calculus.

ii) Define an anti-derivative of a continuous function.

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

$$f(x) = \int_{x^2}^{\frac{x}{1+x^2}} (1+3t^6)^{\frac{1}{6}}\, dt$$

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

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

$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{\sin(t)+t\cos(t)}{t^2\sin^2(t)}$$

Problem #4. *Verify that the volume of a ball of radius r is $\frac{4}{3}\pi r^3$.*

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

i) $x+y^2=2$, $x+y=0$.

ii) $y=\sin(\pi x)$, $y=x^2-x$, $x=2$.

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