Score:	Name:

QUIZ 5 - 04/24/03
Calculus I - V63.0121

Masmoudi–Schneiderman–Wendl

Instructions: *This quiz should be taken in 20 minutes without text, notes or calculators.*

1. (5pts.) State one of the two forms of the Fundamental Theorem of Calculus.

   ANSWERS: (FTC1) If f is continuous and $g(x) = \int_a^x f(t)\ dt$ then $g'(x) = f(x)$.

   (FTC2) If f is continuous then $\int_a^b f(x)\ dx = F(b) - F(a)$ where F is any antiderivative of f, that is $F' = f$.

2. (5pts.) Find $f(t)$ such that $f''(t) = 3e^t + 5\sin(t), \quad f(0) = 1, \quad$ and $f'(0) = 2$.

   ANSWER: Anti-differentiating f'': $f'(t) = 3e^t - 5\cos(t) + c$ and $f'(0) = 2 = 3 - 5 + c$ imply that $c = 4$ so $f'(t) = 3e^t - 5\cos(t) + 4$. Anti-differentiating f': $f(t) = 3e^t - 5\sin(t) + 4t + d$ and $f(0) = 1 = 3 + d$ imply that $d = -2$ so $f(t) = 3e^t - 5\sin(t) + 4t - 2$

3. (5pts.) Compute $\int_1^2 (x^{-2} + x)\ dx$. ANSWER:

$$\int_1^2 (x^{-2} + x)\ dx = (-x^{-1} + \frac{x^2}{2})\Big|_1^2 = (-\frac{1}{2} + 2) - (-1 + \frac{1}{2}) = 2.$$

4. (5pts.) Compute

$$\frac{d}{dx}\Big[\int_0^{x^2} \sin(t)\ dt\Big]$$

   ANSWER: By FTC1 and chain rule, $\frac{d}{dx}[\int_0^{x^2} \sin(t)\ dt] = \sin(x^2) \cdot 2x$.