Math 232 Spring 2002
Quiz 9 (4/2) Name: _____ 01/02

You have 20 minutes to take this quiz. Each problem will be graded for clarity of work as well as correctness, so show all work **clearly and in order**. Circle or otherwise indicate your final answers. Please note that there are problems on both the front and the back of this page.

1. **(*4 points*)** Circle "FTC" if a statement is equivalent to the Fundamental Theorem of Calculus, and circle "NOT" otherwise. (You may assume that all functions named are continuous).

(**a**) **FTC** **NOT** If $f'(x) = F(x)$ then $\int_a^b f(x)\,dx = F(b) - F(a)$.

(**b**) **FTC** **NOT** If $f'(x) = F(x)$ then $\int_a^b F(x)\,dx = f(b) - f(a)$.

(**c**) **FTC** **NOT** $\int_a^b h''(x)\,dx = [\, h'(x) \,]_a^b$.

(**d**) **FTC** **NOT** $\int_a^b g(x)\,dx = \left[\int g(x)\,dx\right]_a^b$.

2. **(*4 points*)** Define the function $A(x) = \int_1^x 3 - x\,dx$ for $x \in [1, 6]$.

(**a**) Illustrate $A(4)$ graphically. (Hint: First you'll have to sketch a graph of the function $f(x) = 3 - x$.)

(**b**) On what interval is the function $A(x)$ positive, and why?

Turn over for more...

3. (*6 points*) Use the Fundamental Theorem of Calculus and the method of integration by substitution to find the exact value of:

$$\int_0^3 x(x^2+1)^{\frac{1}{3}}\,dx.$$

Show all work clearly, including the steps where you make the substitution (*i.e.* the change of variables).

4. (*6 points*) Fill in each of the blanks below (your answers should *not* involve an integral sign). You may assume that a and b are real numbers and that any functions named are continuous.

(**a**) $\dfrac{d}{dx}\left(\displaystyle\int_a^b f(x)\,dx\right) =$ _____ .

(**b**) $\dfrac{d}{dx}\left(\displaystyle\int_a^{x^2} f(t)\,dt\right) =$ _____ .

(**c**) $\displaystyle\int f'(u(x))u'(x)\,dx =$ _____ .