2. (8 points) **(a)** Give the statement of the fundamental theorem of calculus.

If f is continuous on $[a,b]$ and $F' = f$, then

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

(b) Give a specific instance of the fundamental theorem by using the interval $-2 \le x \le 3$ and the function x^2 for one of the functions in your statement of the theorem.

Example

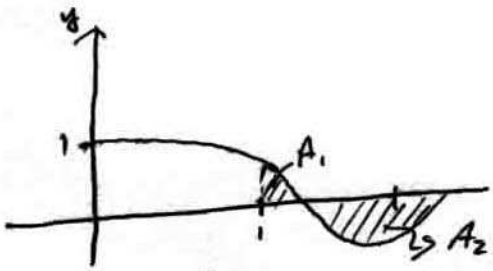
$$\int_{-2}^{3} x^2\,dx = \frac{x^3}{3}\Big]_{-2}^{3} = \frac{3^3}{3} - \frac{(-2)^3}{3} = 9 + \frac{8}{3} = \frac{35}{3}$$

or

$$\int_2^3 2x\,dx = x^2\Big]_{-2}^{3} = 9 - 4 = 5$$

3. (4 points) Suppose $f'(x) = \cos(x^2)$. Use the graph of $f'(x)$ to decide which is larger, $f(1)$ or $f(2)$. Explain the reason for your answer.

graph of $\cos(x^2)$ on $[0,2]$ looks like



Thus $f(1) > f(2)$,

since $\int_1^2 f'(x)\,dx = f(2) - f(1)$ would be negative

i.e. the small positive A_1 minus the larger A_2