MATH 180 (16397) Quiz 12 (Version 1) 04/26/06; Solution 02/23/06

Name (print) _____ **Discussion hour (T Th ___)**

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1. (10 pts.) Find the area of the region in the plane bounded by the lines $x = 1, x = 2$, the x-axis, and the graph of the function $y = x^2 + 3x$.

Solution: Let $\boxed{F(x) = \frac{x^3}{3} + \frac{3x^2}{2}}$ (**3 points**). Since $F'(x) = x^2 + 3x$, the area is

$$\int_1^2 (x^2 + 3x)\, dx = \boxed{F(2) - F(1) = (\frac{8}{3} + 6) - (\frac{1}{3} + \frac{3}{2}) = \frac{41}{6}} \text{ (7 points)}.$$

2. (10 pts.) Find the area of the region in the plane bounded by the curves $y = x^3$ and $y = x^5$, where $0 \leq x \leq 1$.

Solution: Let $\boxed{F(x) = \frac{x^4}{4} - \frac{x^6}{6}}$ (**3 points**). Since $F'(x) = x^3 - x^5$, the area is

$$\int_0^1 (x^3 - x^5)\, dx = \boxed{F(1) - F(0) = (\frac{1}{4} - \frac{1}{6}) - 0 = \frac{1}{12}} \text{ (7 points)}.$$

MATH 180 (16397) **Quiz 12 (Version 2) 04/26/06;** **Solution 02/23/06**

Name (print) _____ **Discussion hour (T Th ___)**

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1. (10 pts.) Find the area of the region in the plane bounded by the lines $x = 1, x = 3$, the x-axis, and the graph of the function $y = x^2 + 5x$.

Solution: Let $\boxed{F(x) = \frac{x^3}{3} + \frac{5x^2}{2}}$ (**3 points**). Since $F'(x) = x^2 + 5x$, the area is

$$\int_1^3 (x^2 + 5x)\, dx = \boxed{F(3) - F(1) = (9 + \frac{45}{2}) - (\frac{1}{3} + \frac{5}{2}) = \frac{86}{3}} \text{ (7 points)}.$$

2. (10 pts.) Find the area of the region in the plane bounded by the curves $y = x^2$ and $y = x^7$, where $0 \leq x \leq 1$.

Solution: Let $\boxed{F(x) = \frac{x^3}{3} - \frac{x^8}{8}}$ (**3 points**). Since $F'(x) = x^2 - x^7$, the area is

$$\int_0^1 (x^2 - x^7)\, dx = \boxed{F(1) - F(0) = (\frac{1}{3} - \frac{1}{8}) - 0 = \frac{5}{24}} \text{ (7 points)}.$$