NAME.....

Intuitive Calculus 11012 Quiz A
April 8, 2010 Richard M. Aron

1. Find each indefinite integral:

(a). $\int 18y^{17}dy.=$ $y^{18} + C$

(b). $\int (u+1)(u+2)du.=$ $\int (u^2+3u+2)du$
$= \frac{u^3}{3} + \frac{3u^2}{2} + 2u + C$

(c). $\int (e^{3x} - \frac{3}{x})dx.=$ $\frac{e^{3x}}{3} - 3\ln x + C$

2. The cost of maintaining a home generally increases as the home becomes older. Suppose that the rate of cost (dollars per year) for a home that is x years old is $200e^{0.4x}$. Find a formula for the total maintenance cost during the first x years. (Maintenance should be zero at $x = 0$.)

Given $r(t) = 200e^{.4x}$. So $M(t)$ = maintenance cost $= \int r(t)dt = 500e^{.4x} + C$. Now, in the beginning, when $x=0$, $M(0)=0$. So, $0 = 500e^0 + C = 500 + C$. Get $C = -500$.
Thus, $M(t) = 500e^{.4x} - 500$. (So, eg, after 5 years one is spending over $3000 for maintenance)

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1. Find each indefinite integral:

(a). $\int 10u^9 du. =$ $u^{10} + C$

(b). $\int (x-1)(x+2)dx =$ $\int (x^2 + x - 2)\,dx$

$= \frac{x^3}{3} + \frac{x^2}{2} - 2x + C$

(c). $\int (e^{2x} - \frac{2}{x})dx =$ $\frac{e^{2x}}{2} - 2\ln x + C$

2. An ice cube tray filled with tap water is placed in the freezer, and the temperature of the water is changing at the rate of $-12e^{-0.2t}$ degrees per hour after t hours. The original temperature of the tap water was 70 degrees. Find a formula for the temperature of water that has been in the freezer for t hours.

Given: $r(t) = -12e^{-.2t}$. Temperature $T(t) = \int r(t)\,dt = 60e^{-.2t} + C$. Now, at time $t=0$, $T(0)$ = original temperature = $70 = 60e^0 + C$. So, $C = 10$. Thus, $T(t) = 60e^{-.2t} + 10$. (So, after 5 hours, the water should be frozen).