Math 34B

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March 13, 2012

Click as you do the following:

A) $\frac{d}{dx}\left(\frac{1}{x^3} + e^{3x} + k^2\right)$

B) $\frac{d}{dx}\left(x^2 \sin(3x)\right)$

C) $\int \ 4x^3 + 5k^2 \ dx$

D) $\int_0^4 \ ax + b \ dx$

E) $\frac{\partial}{\partial x}\left(3x^4y^5 + 7xy + 3x + 4y\right)$

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A) $-3x^{-4} + 3e^{3x}$

B) $2x\sin(3x) + 3x^2\cos(3x)$

C) $x^4 + 5k^2x + C$

D) $8a + 4b$

E) $12x^3y^5 + 7y + 3$

How many did you get right ? A=5 B = 4 C = 3 D = 2 $E \leq 1$

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$\int_1^2 6x^2 dx \; = \; \left[2x^3\right]_1^2 = 2(2)^3 - 2(1)^3 = 16 - 2 = 14$
check $\frac{d}{dx}\left(2x^3\right) = 2(3x^2) = 6x^2 \checkmark$

The number of Kg of a chemical produced during a reaction depends on the number grams present, x and y of two catalysts called X and Y. The number of Kg produced is $f(x, y)$. If $f(4, 2) = 20$ and $f_x(4, 2) = 3$ and $f_y(4, 2) = 2$ how many Kg will be produced using 4.2 grams of X and 2.1 grams of Y. ?

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$A = 0.6 \quad B = 0.2 \quad C = 20.6 \quad D = 20.8$ $\boxed{\text{D}}$

$\Delta x = 0.2$ and $\Delta y = 0.1$

So $f(4 + \Delta x, 2 + \Delta y)$

$\approx f(4, 2) + f_x(4, 2)\Delta x + f_y(4, 2)\Delta y$

$= 20 + (3)(0.2) + (2)(0.1) = \boxed{20.8}$

Initially a lake contains 20000 acre feet of pure water. Then contamination starts to enter so that after t months it is going in at a rate of $4t$ acre feet per month. How many months until the contamination equals 1% of the initial amount of water ?

$A = 5 \quad B = 10 \quad C = 20 \quad D = 40$

Initially a lake contains 20000 acre feet of pure water. Then contamination starts to enter so that after t months it is going in at a rate of $4t$ acre feet per month. How many months until the contamination equals 1% of the initial amount of water ?

$A = 5 \quad B = 10 \quad C = 20 \quad D = 40 \quad \boxed{B}$

$V(t) =$ volume of contaminant in lake after t months.
Told $V'(t) = 4t$ so $V(t) = \int_0^t 4t \; dt = 2t^2$.
1% of 20000 is 200.
Contaminant is 1% of pure water when $2t^2 = 200$ so $\boxed{t = 10}$

Find the minimum of $f(x, y) = x^2 - 2x + y^2 - 4y + 8$

$A = 1 \quad B = 2 \quad C = 3 \quad D = 4$

Find the minimum of $f(x, y) = x^2 - 2x + y^2 - 4y + 8$

$A = 1 \quad B = 2 \quad C = 3 \quad D = 4 \quad \boxed{C}$

For min $f_x(x, y) = 2x - 2$ so $x = 1$
and $f_y(x, y) = 2y - 4 = 0$ so $y = 2$
min is $f(1, 2) = (1)^2 - 2(1) + (2)^2 - 4(2) + 8 = 3$