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Group 3

1. $\int 14x (7x^2 + 9)^{13} dx$

Step 1: let $u = (7x^2 + 9)$

Step 2: Then $\frac{du}{dx} = 14x$ OR $du = 14x dx$

Step 3: $\int \underline{14x} (u)^{13} \underline{dx} = \int (u)^{13} du$

Step 4: $\int (u)^{13} du = \frac{1}{14} u^{14} + C$

Step 5: $\int 14x (7x^2 + 9)^{13} dx = \frac{1}{14} (7x^2 + 9)^{14} + C$

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$$2. \int \underline{x^2} (5x^3 + 22)^4 \underline{dx}$$

$$\text{Step 1: let } \boxed{u = (5x^3 + 22)}$$

$$\text{Step 2: Then } \frac{du}{dx} = 15x^2$$

$$\text{so } du = 15x^2 dx$$

$$\text{better yet } \boxed{\left(\frac{1}{15}\right) du = \underline{x^2 dx}}$$

$$\text{Step 3: } \int x^2 dx (5x^3 + 22)^4 dx = \int \left(\frac{1}{15}\right) du (u)^4$$

$$\text{Step 4: } \frac{1}{15} \int u^4 du = \boxed{\left(\frac{1}{15}\right) \left(\frac{1}{5}\right) u^5 + C}$$

$$\text{Step 5: } \int x^2 (5x^3 + 22)^4 dx = \boxed{\frac{1}{75} (5x^3 + 22)^5 + C}$$

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3. $F'(x) = x^3 + 6x - 5 = f(x)$

4. $\int x^3 dx$

$\frac{1}{(3+1)} x^{(3+1)} + C = \frac{1}{4} x^4 + C$

5 a. 457

b. 0.07

C, t	0	5	10	15	20
Q	457	648.51	920.28	1305.9	1853.2

From calc. graphing →

- 1. $1 = 457 e^{.07x}$
- 2. TBLSET
STRT=0
ΔTBL=5
- 3. TABLE

6. 9. $P(h) = P_0 e^{-kh}$

$P(14,000) = 15 e^{-K(14,000)} = 7.92$

solve for K

$e^{-K(14,000)} = \frac{7.92}{15} = .528$

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(a.)
6. cont.

$$e^{-K(14000)} = .528$$

$$\sqrt{\ln e^{-K(14000)}} = \ln(.528)$$

$$\text{So } -K(14,000) \ln e = \ln(.528)$$

$$-K = \frac{\ln(.528)}{14,000} = -4.56 \times 10^{-5}$$

$$K \doteq .0000456$$

$$(b.) \quad P(23,000) = 15 e^{-(.0000456)(23,000)}$$

$$P(23,000) \doteq 5.26 \text{ lb./in}^2$$

$$(c.) \quad P'(h) = -K P(h) \quad P(h) = P_0 e^{-Kh}$$

$$P'(23,000) = -(.0000456)(5.26)$$

$$P'(23,000) \doteq -.00024 \text{ lb./in}^2/\text{ft}$$

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Group 1 Brady Bunch

$$7. \int 10x (5x^2+7)^6 dx$$

$$u = (5x^2+7) \quad du = 10x dx$$
$$\int u^6 du = \frac{1}{7} u^7 + C = \boxed{\frac{1}{7} (5x^2+7)^7 + C}$$

$$8. \int x^2 (4x^3+18)^{12} dx$$

$$u = 4x^3+18 \quad du = 12x^2 dx \quad \text{so } \frac{1}{12} du = x^2 dx$$

$$= \int \frac{1}{12} du (u)^{12} = \frac{1}{12} \int u^{12} du$$

$$= \frac{1}{12} \left(\frac{1}{13} \right) u^{13} + C = \boxed{\frac{1}{156} (4x^3+18)^{13} + C}$$

$$9. F'(x) = x^4 + 12x^3 - 14x + 13 = f(x)$$

$$10. \int x^{-4} dx = \frac{1}{(-4+1)} x^{(-4+1)} + C = \boxed{-\frac{1}{3} x^{-3} + C}$$

$$\text{OR } \boxed{-\frac{1}{3x^3} + C}$$

$$11. \int \cancel{x} \left(\frac{2}{x^3} \right) dx$$

$$= \int 2x^{-3} dx = 2 \left(\frac{1}{\cancel{-3+1}^{-2}} x^{\cancel{-3+1}} \right) + C$$

$$= \boxed{-x^{-2} + C} \text{ OR } \boxed{-\frac{1}{x^2} + C}$$

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$$\#12. \int (3t+2)(t-1) dt$$

$$= \int (3t^2 + 2t - 3t - 2) dt$$

$$= \int (3t^2 - t - 2) dt$$

$$= 3 \left(\frac{1}{2+1} \right) t^{(2+1)} - \frac{1}{(1+1)} t^{(1+1)} - 2 \left(\frac{1}{0+1} \right) t^{0+1} + C$$

$$= \boxed{t^3 - \frac{1}{2}t^2 - 2t + C}$$

group 2 problems

$$\#13. \int \left(\frac{2}{x^4} \right) dx = \int 2x^{-4} dx$$

$$= 2 \left(\frac{1}{(-4+1)} \right) x^{(-4+1)} + C$$

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

$$14. \int (t-7)(t+1) dt = \int (t^2 - 7t + t - 7) dt$$

$$= \int (t^2 - 6t - 7) dt = \boxed{\left(\frac{1}{3} \right) t^3 - 3t^2 - 7t + C}$$

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$$15. \int 5e^x dx = 5 \int e^x dx \\ = \boxed{5e^x + C}$$

$$16. Q(t) = Q_0 e^{kt}$$

$$a. Q(10) = 230 e^{k(10)} = 690$$

$$e^{10k} = \frac{690}{230} = 3$$

$$\ln e^{10k} = \ln 3$$

$$10k \ln e = \ln 3$$

$$k = \frac{\ln 3}{10} \doteq .1099 \doteq .11$$

$$\boxed{k \doteq .11}$$

$$b. 230 e^{(.11)t} = 309,000$$

$$e^{.11t} = \frac{309,000}{230} \doteq 1304.348$$

$$\ln e^{.11t} = \ln(1,304.348)$$

$$.11t = \ln(1,304.348)$$

$$t = \frac{\ln(1,304.348)}{.11} \doteq \boxed{65.21 \text{ min}}$$

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16. C. $Q(65.21) = 300,000$

find $Q'(65.21)$

$$Q'(t) = k Q(t)$$

$$Q'(65.21) = (.11) \left(\overset{Q(65.21)}{\underset{\downarrow}{300,000}} \right) = \boxed{33,000 \frac{\text{cells}}{\text{min}}}$$

Study hard

get hmwk
6.1 & 6.2
plus
1

done for tomorrow.