

Notes for 4/28/2015

Main Goal! Review for Exam 3 (4.5-6.1)

* Middle Group To Black Board (Ashleigh Group)

(Review 6.1) indefinite integrals

1. $\int (x^3 + 5 + x^{-4}) dx$

2. $\int 13e^x dx$

answers: $F(x) = \frac{1}{4}x^4 + 5x - \frac{1}{3}x^{-3} + C$

check: $F'(x) = ?$

answer: $F(x) = 13e^x + C$

Find The 1st derivative of:

3. $f(x) = \ln(5x+14)$
 $f'(x) =$

4. $f(x) = e^{(6x-13)}$
 $f'(x) =$

5. $f(x) = e^{(6x-13)} \ln(5x+14)$
 $f'(x) =$

answers: $f'(x) = \frac{5}{(5x+14)}$

$f'(x) = 6e^{(6x-13)}$

$f'(x) = e^{(6x-13)} \left(\frac{5}{(5x+14)} + \ln(5x+14) \right)$
 $f'(x) = e^{(6x-13)} \left(6 \ln(5x+14) + \frac{5}{(5x+14)} \right)$

Find The second derivative of each function.

6. $f(x) = e^{7x} - e^{-8x}$
 $f'(x) =$
 $f''(x) =$

7. $f(x) = \ln(3x^7)$

answers: $f'(x) = 7e^{7x} + 8e^{-8x}$
 $f''(x) = 49e^{7x} - 64e^{-8x}$

$f'(x) = \frac{21x^6}{3x^7} = 7x^{-1}$
 $f''(x) = -\frac{7}{x^2}$
 ~~$f''(x) = -\frac{7}{x^2}$~~

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 * Last Group To Blackboard R's; S's; T's; V's & W's
 (R's Through W's) Group

Evaluate The expressions

1. $\frac{(7^{-11})(7^{13})}{7^{(-14)}}$

2. $\frac{(5^{2/3})(5^{1/6})}{5^{(1/12)}}$

answers: $\frac{7^2}{7^{-14}} = 7^2 \cdot 7^{14} = 7^{16}$

$\frac{5^{8/12} 5^{2/12}}{5^{1/12}} = 5^{10/12 - 1/12} = 5^{9/12} = \sqrt[4]{5^3}$
 OR $\sqrt[4]{5^3}$

Solve for x:

3. $\frac{(5x+2)}{13} = \frac{17}{13}$

4. $\text{LOG}_{14}(\frac{2}{3}x - 1) = \text{LOG}_{14}(-\frac{1}{3})$

answers: $5x + 2 = 17$
 $5x = 15$
 $x = 3$

$\frac{2}{3}x - 1 = -\frac{1}{3}$
 $\frac{2}{3}x = -\frac{1}{3} + 1$
 $\frac{2}{3}x = \frac{2}{3}$
 $x = 1$

5. $e^{14x} = 11$

6. $5^x = 117$

answers: $\ln e^{14x} = \ln 11$
 $14x \ln e = \ln 11$
 $14x = \ln 11$
 $x = \frac{\ln 11}{14} = \frac{2.398}{14} = 0.17$

$x = \log_5(117) = \frac{\ln(117)}{\ln(5)} = 2.96$

* First group (Brady Bunch) to blackboard
find 1st derivative

1. $f(x) = 7e^x$
 $f'(x) =$

2. $f(x) = 7e^{5x}$
 $f'(x) =$

answers: $f'(x) = 7e^x$

$f'(x) = 35e^{5x}$

3. $f(x) = 110e^{2x}$

4. $f(x) = 110e^{Kx}$ where $K \in \mathbb{R}$

answers: $f'(x) = 2(110e^{2x})$
 $f'(x) = 220e^{2x}$

$f'(x) = K(110e^{Kx})$
OR $110Ke^{Kx}$

Solve for K

5. $110e^{12K} = 440$

answer: $e^{12K} = \frac{440}{110} = 4$

$\ln e^{12K} = \ln(4)$

$12K \ln e = \ln(4)$

$12K = \ln(4)$

$K = \frac{\ln(4)}{12} = \frac{1.3863}{12} = \boxed{.1155}$

6. Growth of Bacteria: Given $Q(t) = Q_0 e^{Kt}$

if the initial cell population at $T=0$ is 110 cells and the number of cells quadruples every 12 minutes, $Q(100) = 11,415,474$ cells

what is the rate of growth after 100 minutes.

answer $Q'(100) = K Q(100) = 0.1155(11,415,474) = 1,318,487$ cells/min