Bellwork Alg 2B Monday, January 22, 2018

1. Rationalize each denominator. Simplify your answer.

a) $\frac{24c^2d}{\sqrt[4]{9c^{13}d^6}}$

b) $\frac{24}{7+\sqrt{13}}$

2. Simplify.

$(5-3\sqrt{7})(2+2\sqrt{7})$

---

3. The population of a city has been decreasing 2.3% each year. There were 120,000 people in the city in 2015.

a) Find the population in 2006.

b) Find the number of years it will take for the population to reach 90,000.

4. Use all the properties of logarithms to write this as a single logarithm.

$8\log A - \frac{1}{3}(\log B + 6\log C)$

5. Solve. $6e^{x+1} - 7 = 32$

6. Write the equation of this ellipse: Foci are $(-16,13)$ & $(6,13)$ and minor axis is 10 units long.

7. Write the equation of the circle that has a diameter with the following endpoints: $(17,-12)$ & $(-1,2)$.

8. Find the 17th term of this geometric sequence: $a_5 = 0.32$ $a_9 = 81.92$

9. Find the sum of each series, if it exists.

a) $0.002, 0.01, 0.05, \ldots 488281.25$

b) $-22,-15,-8,-1,\ldots,202$

ALG 2B Bellwork **ANSWERS** Monday 1-22-18

(1) a) $\dfrac{24c^2d}{\sqrt[4]{9c^{13}d^6}} \cdot \dfrac{\sqrt[4]{3^2c^3d^2}}{\sqrt[4]{3^2c^3d^2}} = \dfrac{24c^2d\sqrt[4]{9c^3d^2}}{\sqrt[4]{3^4c^{16}d^8}} = \dfrac{24c^2d\sqrt[4]{9c^3d^2}}{3c^4d^2}$

($9 = 3^2$)

$= \boxed{\dfrac{8\sqrt[4]{9c^3d^2}}{c^2d}}$

b) $\dfrac{24}{7+\sqrt{13}} \cdot \dfrac{7-\sqrt{13}}{7-\sqrt{13}} = \dfrac{24(7-\sqrt{13})}{49-13} = \dfrac{24(7-\sqrt{13})}{36}$

$= \boxed{\dfrac{2(7-\sqrt{13})}{3} \text{ or } \dfrac{14-2\sqrt{13}}{3}}$

(2) $(5-3\sqrt{7})(2+2\sqrt{7})$

	5	$-3\sqrt{7}$
2	10	$-6\sqrt{7}$
$+2\sqrt{7}$	$+10\sqrt{7}$	$-6\cdot 7 = -42$

$= \boxed{-32+4\sqrt{7}}$

(3) $y = 120{,}000(.977)^x$

a) $x = -9$ $\quad y = 147{,}955$

b) $\dfrac{90{,}000}{120{,}000} = \dfrac{120{,}000(.977)^x}{120{,}000}$

$.75 = .977^x$

$\log_{.977}(.75) = x$

$x = \dfrac{\log(.75)}{\log(.977)} = \boxed{12.36}$

(4) $8\log A - \frac{1}{3}(\log B + 6\log C)$

$= 8\log A - \frac{1}{3}\log B \quad 2\log C$

$= \boxed{\log \dfrac{A^8}{\sqrt[3]{B}\cdot C^2}}$

(5) $6e^{x+1} - 7 = 32$

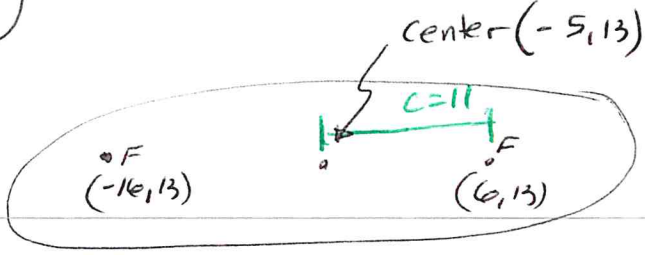
$6e^{x+1} = 39$

$e^{x+1} = 6.5$

$\ln 6.5 = x+1$

$x = 0.87$

(6)



minor axis → $2b = 10$

$b = 5$

$$\frac{(x+5)^2}{146} + \frac{(y-13)^2}{25} = 1$$

a^2 b^2

$c = 11$ $b = 5$

$c^2 = 121$ $b^2 = 25$

$c^2 = a^2 - b^2$

$121 = a^2 - 25$

$a^2 = 146$

(7) endpoints of diameter

$(17, -12)$ & $(-1, 2)$

center $= \left(\frac{17+-1}{2}, \frac{-12+2}{2}\right) = (8, -5)$

r = distance from center to one of two endpts

$r = \sqrt{(8--1)^2 + (-5-2)^2} = \sqrt{9^2 + (-7)^2} = \sqrt{81+49}$

$= \sqrt{130}$

$r^2 = 130$

Eq: $(x-8)^2 + (y+5)^2 = 130$

(8) $a_5 = 0.32 \qquad a_9 = 81.92$

find r:

$0.32 \cdot r^4 = 81.92$

$r^4 = \frac{81.92}{0.32}$

$r = \pm \sqrt[4]{\frac{81.92}{0.32}} = \pm 4$

find a_1: $\frac{a_5}{r^4} = .00125$

explicit formula

$a_n = .00125(\pm 4)^{17-1} = \boxed{5368709.12}$

(9) a) $0.002, 0.01, 0.05, \ldots 488281.25$

GEO $r = 5$

terms:

$488281.25 = .002(5)^{n-1}$

$244140625 = 5^{n-1}$

$\log_5(244140625) = n-1 \qquad n = 13$

$\frac{\log(244140625)}{\log(5)} = n-1$

$S_{13} = \frac{.002(1-5^{13})}{1-5} = \boxed{610351.562}$

b) $-22, -15, -8, -1, \ldots, 202$

ARITH $d = 7$

terms

$202 = -22 + 7(n-1)$

$n = 33$

$S_{33} = \frac{33}{2}(-22 + 202) = \boxed{2970}$