

3U Exponential Functions

So Bad

Name: Say Say

1. Simplify each of the following, expressing with positive exponents.

c) $\left(\frac{3x^2}{y^{-3}}\right)^{-5}$

[6]

4.5

$$\begin{aligned} &= \frac{3^{-5} x^{-10}}{y^{15}} \\ &= \frac{1}{y^{15}} \cdot \frac{1}{3^5} x^{-10} \\ &= \frac{1}{y^{15} 243 x^{10}} \end{aligned}$$

d) $[(2x^2)^{-2}]^{-3}$

$$\begin{aligned} &= (2^{-2} x^{-4})^{-3} \\ &= (2^6 x^{12})^{-3} \\ &= \end{aligned}$$

Solve all the exponents.

e) $\frac{(mn^3)^{-\frac{1}{2}}}{m^{\frac{1}{2}}n^{\frac{5}{2}}}$

[8]

?

umm.....

$$\begin{aligned} &= \frac{m^{-\frac{1}{2}} n^{-1.5}}{m^{\frac{1}{2}} n^{\frac{5}{2}}} \\ &= \frac{n^{-1.5}}{m^{\frac{1}{2}} - (-\frac{1}{2}) n^{\frac{5}{2}}} \\ &= \frac{n^{-1.5}}{m^{\frac{1}{2}} n^{\frac{5}{2}}} \\ &= \frac{1}{m^{\frac{1}{2}} n^{\frac{11}{2}}} \end{aligned}$$

f) $\frac{(-2yx^5)^3}{8y^{-3}x^{10}}$

$$\begin{aligned} &= \frac{-2^3 y^3 x^{15}}{8y^{-3} x^{10}} \\ &= \frac{-2^3 y^{15}}{8y^{-3-(-3)} x^{10}} \\ &= \frac{-2^3 x^5}{8y^{-8} x^{10}} \\ &= \frac{8y^8 x^{15-10}}{-2^3} \\ &= \frac{8y^8 x^5}{-8} \\ &= -y^6 x^5 \end{aligned}$$

2. For the following function (i) State the base(parent) function($f(x)$), (ii) state the equation of the **asymptote**, (iii) the **y-intercept** and (iv) write in the form $y = a \cdot f(b(x-c)) + d$



c) $y = 2 \left(3^{-\frac{1}{2}(x-2)}\right) - 4$

(i) $f(x) = 2 \left(3^{-\frac{1}{2}(x-2)}\right) - 4$

(ii) $y = -2$

(iii) $y\text{-int} = -4$

(iv) $y = 2(3(-2x-4))-4$

$$2(3^{-\frac{1}{2}(-2)}) - 4 = 2 \times 3 - 4 = 2$$

$$2f(-\frac{1}{2}(x-2))-4$$



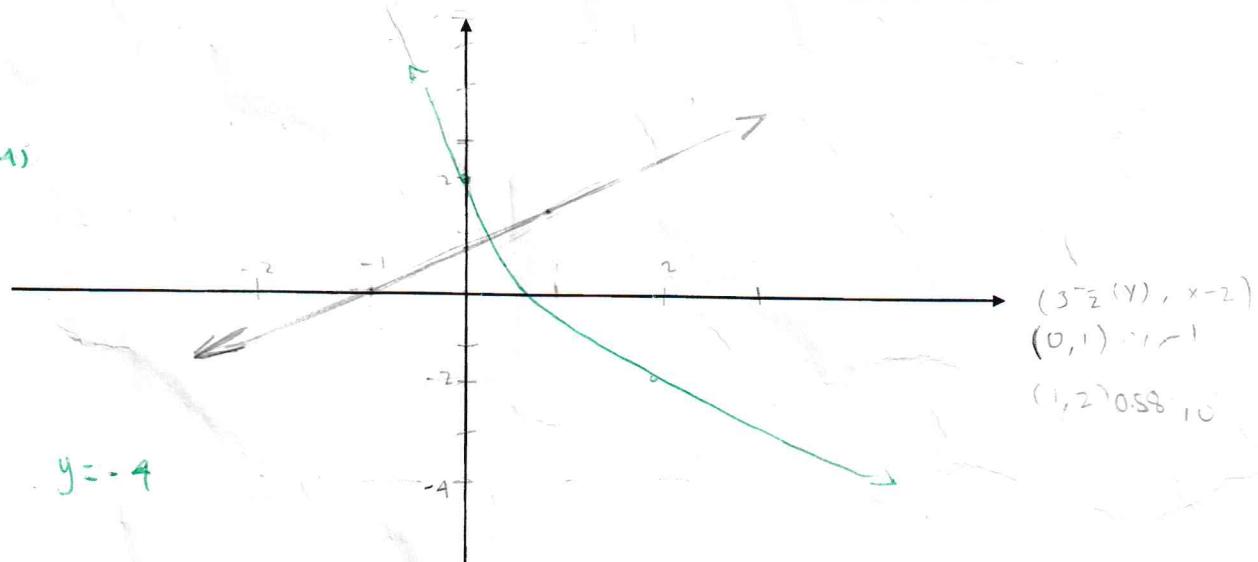
3. Graph and label the function (c) in question 2. (Identify at least 2 key points and the asymptote on the graph.) (show and use pointwise formula) *I did that the first time*

0 [4]

$$(x, y) \rightarrow (-2x + 2, 2y - 1)$$

$$(0, 1) \rightarrow (2, -2)$$

$$(1, 3) \rightarrow (0, 2)$$



$$y = -4$$

$$\begin{aligned} & (3^{-2}(y), x-2) \\ & (0, 1) \rightarrow (-1) \\ & (1, 2) \rightarrow (0, 2) \end{aligned}$$

4. A computer loses its value each month after it is purchased. Its value (in \$) as a function of time m (in months) is modeled by $V(m) = 1500(0.95)^m$. *need therefore,*

BRUT

0.5

- (a) What is the initial value of the computer? Show mathematically.

[1]

0

- (b) What is the rate of depreciation? (Express as a %)

$$95\% \quad \frac{95}{100} = 0.95$$

I have no idea what im doing.



[1]

0.5

- (c) Determine the value of the computer after 2 years.

$$V(m) = 1500(0.95)^{\frac{24}{m}}$$

*After 2 year
value of computer
would be \$1353.75*

[2]

- (d) In which month after it is purchased does the computer's value fall below \$900? (hint: if you are 16 years old (and past your birthday) then you are in your 17th year.)

nope

$$900 = 1500(0.95)^{\frac{146.25}{24}}$$

$$\frac{9}{15} = 0.95^m$$

$$m = \frac{\log(\frac{3}{5})}{\log(0.95)}$$

It would take

$$= 9.96$$

Time	Value (\$)
1 year	1207.5
6 years	1061.25
8 years	915
3 months	896.72

8 years and about 3 month for the price to fall below 900 dollars

$\frac{1}{9}$

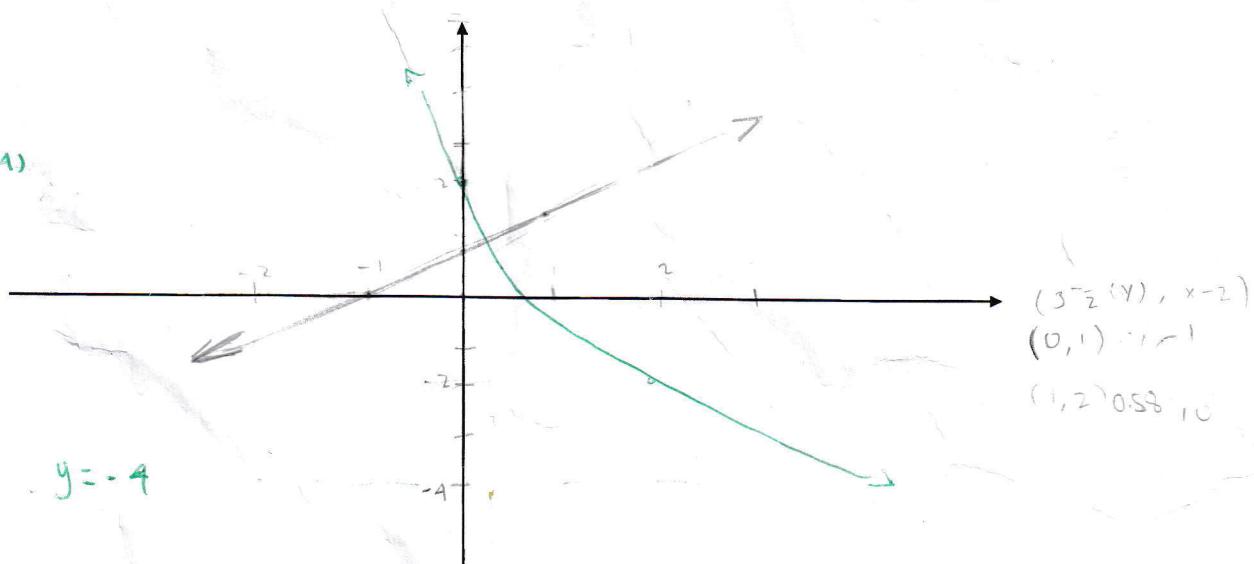
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4. A computer loses its value each month after it is purchased. Its value (in \$) as a function of time m (in months) is modeled by $V(m) = 1500(0.95)^m$. *need therefore,*

BRUT

05

- (a) What is the initial value of the computer? Show mathematically.

~~initial value~~

$$V(m) = 1500(0.95)^m$$

per cent
time
initial value



- (b) What is the rate of depreciation? (Express as a %)

[1]

0

$$95\% \quad \frac{95}{100} = 0.95$$

I have no idea what im doing.

- (c) Determine the value of the computer after 2 years.

[1]

05

$$V(m) = 1500(0.95)^{\frac{24}{12}}$$

After 2 year
value of computer
would be \$1853.75

- (d) In which month after it is purchased does the computer's value fall below \$900? (hint: if you are 16 years old (and past your birthday) then you are in your 17th year.)

[2]

$$900 = 1500(0.95)^m$$

$$\frac{9}{15} = 0.95^m$$

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