

## Pure 21 - Exponential functions

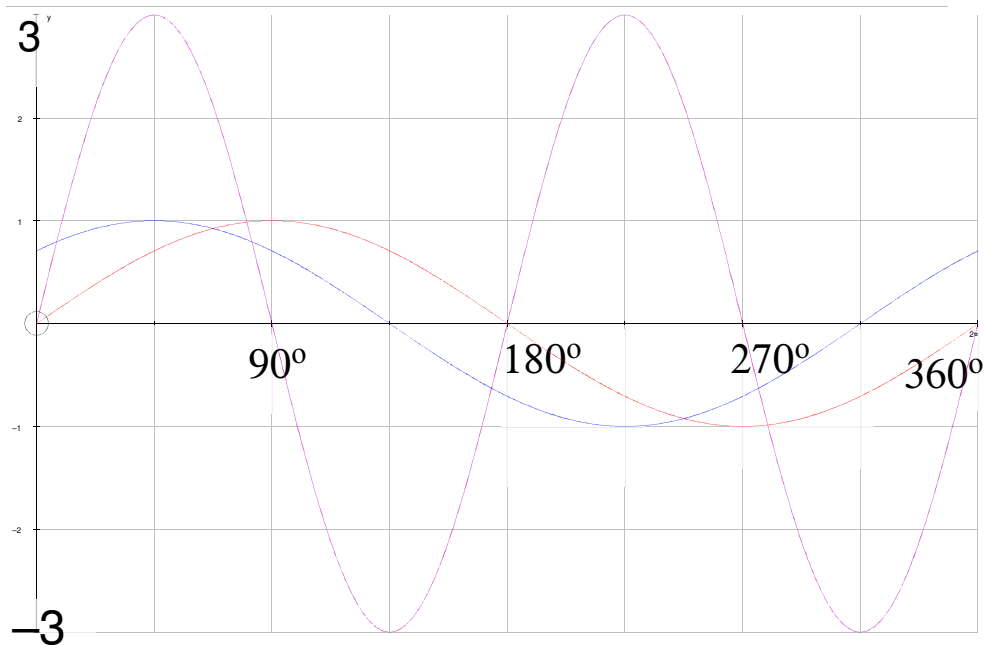
Please **complete** this homework by \_\_\_\_\_. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics. Please complete all questions.

Solve 1)  $\cos^2x + \cos x = 0$   $0 \leq x \leq 360^\circ$

2)  $2\sin^2x = 3\cos x + 3$   $0 \leq x \leq 360^\circ$

3) Write down the equations of these graphs in terms of  $\sin(x)$ :



4) Express the following in terms of  $ax^n$

a)  $6x^3 \times 5x^7$

b)  $8x^4 \div (12x^7)$

c)  $\frac{2}{x^3}$

d)  $x\sqrt{25x}$

e)  $\frac{3x^5}{\sqrt{x}}$

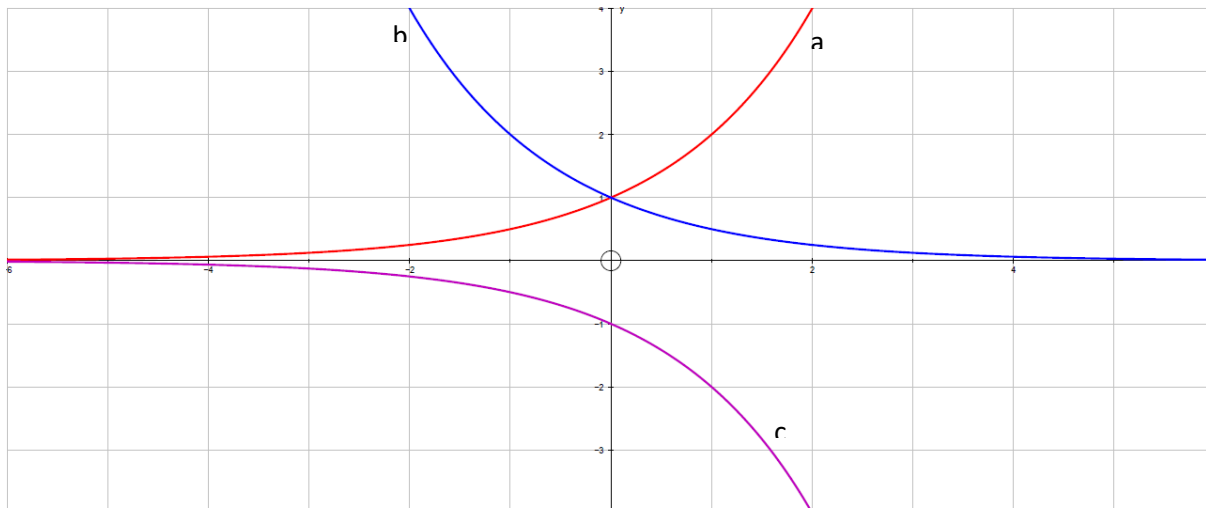
f)  $\frac{2x^{\frac{2}{3}}}{(4x^2)^{\frac{3}{2}}}$

**Section 2 – Consolidation of this week’s topic. Please complete all questions.**

1) Sketch the graphs showing the equations of any asymptotes and intersections with axes.

- a)  $y = e^{x-1}$                       b)  $y = 2e^{-3x}$                       c)  $y = 3e^x + 2$   
d)  $y = 3 - e^x$                       e)  $y = 8 + 5e^{\frac{1}{2}x}$                       f)  $y = 80e^{-x} + 5$                       (12)

2) Identify the equations of these graphs: (6)



3) The number of rabbits in a study,  $N$  is modelled by the formula  $N = 1000 + 500e^{0.5T}$ , where  $T$  is the time measured in years.

- a) How many rabbits were there at the start of the study?  
b) Interpret the meaning of the constant 500 in this model.  
c) How many rabbits does the model predict after 2 years?  
d) Find the rate of increase in the population of rabbits after 1 year. (12)

**(Total 30 Marks)**

**Section 3 – Extension questions. If you are aiming for a top grade, you should attempt these questions.**

- 1) At 2% annual interest compounded annually, how long will it take to double your money?  
2) At 6% annual interest compounded annually, how long will it take to double your money?  
3) During normal breathing, about 12% of the air in the lungs is replaced after one breath. Write an exponential decay model for the amount of the original air left in the lungs if the initial amount of air in the lungs is 500 mL. How much of the original air is present after 24 breaths?