

# GRAPHS – WORKSHEET #5

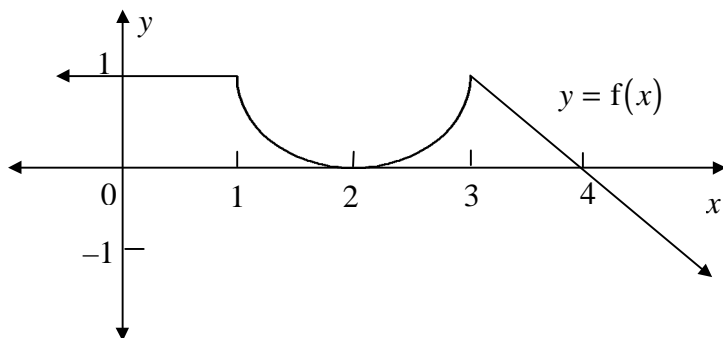
## COURSE/LEVEL

NSW Secondary High School Year 12 HSC Mathematics Extension 2.

## TOPIC

Graphs

1.



For the function  $y = f(x)$  sketched above, draw separate sketches for the following.

(i)  $y = f(x) - \frac{1}{2}$

(v)  $y = \frac{1}{f(x)}$

(ii)  $y = f\left(x - \frac{1}{2}\right)$

(vi)  $y = f(|x|)$

(iii)  $y = f(-x)$

(vii)  $y^2 = f(x)$

(iv)  $y = (f(x))^2$

(viii)  $y = 2^{-f(x)}$

2. Use the graphs of  $y = |x + 2|$  and  $y = |x - 1|$  to sketch the graph of  $y = |x + 2| + |x - 1|$ . Hence, or otherwise, solve the inequality  $|x + 2| + |x - 1| > 4$ .

3. Draw neat separate sketches of the following sketches, without using calculus. Include features such as any  $x$ - and  $y$ - intercepts and the equations of any asymptotes.

(i)  $y = x^3$

(ii)  $y = \frac{1}{x^3}$

(iii)  $y = \frac{x^3 - 1}{x^3}$

(iv)  $y = \frac{x^3}{x^3 - 1}$

(v)  $y = x^3 - \frac{1}{x^3}$

4. Given that  $f(x) = x^2(x^2 - 1)(x + 1)$ , sketch the following functions. (It is not necessary to locate turning points).

(i)  $y = f(x)$

(ii)  $y = f(|x|)$

(iii)  $y = |f(x)|$

(iv)  $y^2 = f(x)$

(v)  $y \cdot f(x) = 1$

5. Suppose the curve  $y = f(x)$  has a stationary point at  $x = a$ . Show that  $g(x) = \frac{1}{f(x)}$  also has a stationary point at  $x = a$  provided  $f(a) \neq 0$ .

6. Let  $f(x) = x - 2 + \frac{3}{x+2}$ .

(i) Find the points at which  $f(x) = 0$ .

(ii) Find the turning points of  $f(x)$ , if any, and identify them.

(iii) Find the asymptotes.

(iv) Sketch the curve, marking all the features you have found in parts (i) - (iii) above.

7. Draw separate sketches of  $y = \frac{x(x-1)}{x-2}$  and  $y = \sqrt{\frac{x(x-1)}{x-2}}$ . Include any  $x$ - or  $y$ -intercepts and asymptotes. (It is not necessary to find the co-ordinates of any stationary points.)

8. Let  $\min(a, b)$  denote the minimum of the numbers  $a$  and  $b$ . Sketch the function  $y = \min(2, x)$  over the interval  $0 \leq x \leq 3$  and evaluate  $\int_0^3 \min(2, x) dx$ .

9. If  $f(x) = (x-2)(x+1)$ , sketch separate graphs of the following:

(i)  $y = f(x)$

(ii)  $y = \frac{1}{|f(x)|}$

(iii)  $y = 2^{-f(x)}$

In each sketch, include the co-ordinates of any stationary or critical points.

10. If  $f(x) = \frac{x+1}{x-2}$ , sketch the following functions.

(i)  $y = f(x)$

(ii)  $y = \ln(f(x))$

(iii)  $y = e^{f(x)}$

(iv)  $y = \sin^{-1}(f(x))$

11. Sketch the following:

(i)  $y = e^{-1/x}$

(ii)  $y = e^{-\sin x}$

(iii)  $y = \cos(x^2)$

(iv)  $y = \cos(\sin^{-1} x)$

12. Without calculus, sketch the curve which represents  $y = \frac{1}{\sqrt{(x+1)(x+3)}}$ .