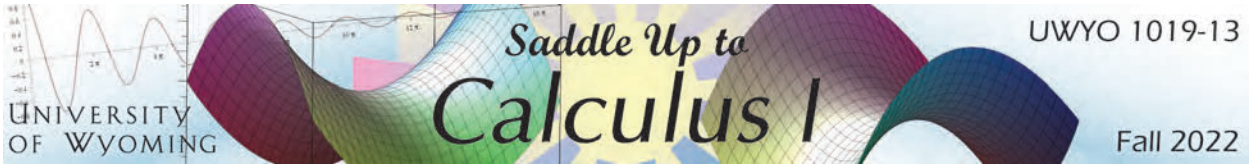


Practice 1

Consider the function $g(x) = x^3 - 7x$. Complete the following six parts.

(a) $g(2) =$ $8 - 14 = -6$

(b) $g(t) =$ $t^3 - 7t$

(c) $g(2+t) =$ $(2+t)^3 - 7(2+t)$
$= t^3 + 6t^2 + 12t + 8 - 7t - 14$
$= t^3 + 6t^2 + 5t - 6$

(d) If $t \neq 0$, then $\frac{g(2+t)-g(2)}{t} =$ $\frac{(t^3+6t^2+5t-6)-(-6)}{t} = \frac{t^3+6t^2+5t}{t}$

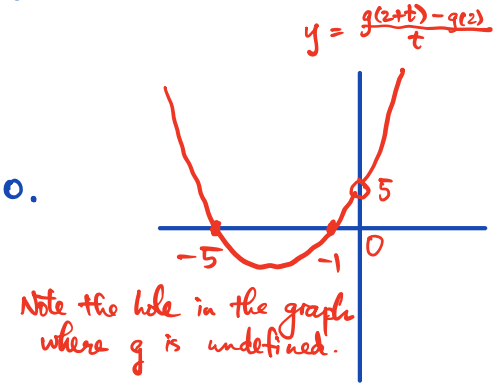
$= t^2+6t+5$

(e) Explain the extent to which the answer in (d) depends on the restriction for t. Without the indicated restriction, what is the simplest form available for $\frac{g(2+t)-g(2)}{t}$?

The answer given in (d) is valid only for $t \neq 0$ since we cannot divide by 0; when $t=0$, the quotient is undefined. In general the simplest form available is

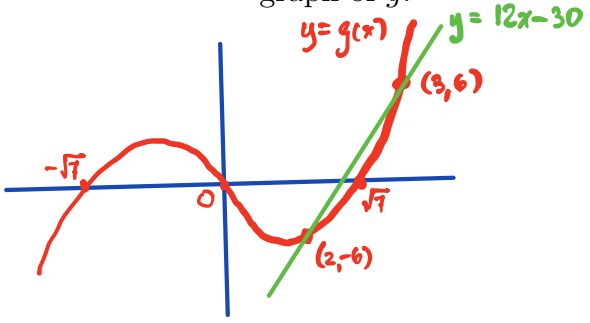
$$\frac{g(2+t)-g(2)}{t} = t^2+6t+5, \text{ if } t \neq 0;$$

and the expression is undefined when $t=0$.



Note the hole in the graph where g is undefined.

(f) Find the equation of the line joining the two points $(2, g(2))$ and $(3, g(3))$ on the graph of g.



The line has slope

$$\frac{g(3)-g(2)}{3-2} = \frac{6-(-6)}{3-2} = \frac{12}{1} = 12$$

So it has equation $y-(-6) = 12(x-6)$,

i.e. $y = 12x-30$.