



HW1

Due 5:00 pm, Monday, August 15, 2022 on WyoCourses

Refer to the syllabus for general expectations regarding homework (and references therein to the FAQ page for further details). In particular please read questions carefully to be sure you are answering the question that is asked. In particular, spelling, grammar, punctuation and vocabulary are as important as mathematical notation and all should be used correctly. *Simplify your answers.* Total value of questions: 20 points (4 points each).

Consider the function $f(x) = x^2 - x + 1$. Complete the following six parts.

(a) $f(2) = 3$

(b) $f(h) = h^2 - h + 1$

(c) $f(2+h) = (2+h)^2 - (2+h) + 1 = 3 + 3h + h^2$

(d) If $h \neq 0$, then $\frac{f(2+h)-f(2)}{h} = \frac{3+3h+h^2-3}{h} = \frac{3h+h^2}{h} = 3+h$

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

We required $h \neq 0$ in order to avoid dividing by zero.
Without this restriction, the quotient is undefined:

$$\frac{f(2+h)-f(2)}{h} = 3+h, \quad \text{if } h \neq 0;$$

it is undefined for $h=0$.

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

The points $(2, 3)$ and $(3, 7)$ are joined by a line having slope $\frac{7-3}{3-2} = 4$, having equation $y-3 = 4(x-2)$, i.e. $y = 4x - 5$.