FAR BEYOND

MAT122

Difference Quotient

Stony Brook University

Evaluating a Function - Review

Do: evaluate the following given $f(x) = 2x^2 - 5x + 1$

$f(2)$

$f(3 - x)$

$f(x + h)$

Difference Quotient

ex. find difference quotient of

$f(x) = 2x^2 - 5x + 1$

$$\frac{f(x+h) - f(x)}{h}$$ given $f(x)$

from previous slide

get $f(x+h) = 2x^2 + 4xh + 2h^2 - 5x - 5h + 1$

use parentheses w minus sign

$$\frac{\overbrace{2x^2 + 4xh + 2h^2 - 5x - 5h + 1}^{f(x+h)} - \overbrace{(2x^2 - 5x + 1)}^{f(x)}}{h}$$

distribute negative

$$= \frac{2x^2 + 4xh + 2h^2 - 5x - 5h + 1 - 2x^2 + 5x - 1}{h}$$

$$= \frac{4xh + 2h^2 - 5h}{h}$$

all terms in numerator will have an h – factor it out

$$= \frac{h(4x + 2h - 5)}{h}$$

$$= 4x + 2h - 5$$

Goal for difference quotient:
Simplify enough to cancel h in denominator

Difference Quotient - Do

ex. find difference quotient of $f(x) = -7x^2 - 4x + 2$

$$\frac{f(x+h) - f(x)}{h}$$

$$= \boxed{-14x - 7h - 4}$$