MATH 119: Quiz 1

Name: _Key_

Directions:

* Show your thought process (commonly said as "show your work") when solving each problem for full credit.
* If you do not know how to solve a problem, try your best and/or explain in English what you would do.
* Good luck!

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1. Suppose $f(x) = x - x^2$. Evaluate and completely simplify the following:

   * $f(-1) = (-1) - (-1)^2 = -1 - 1 = \boxed{-2}$
   * $f(x+h) - f(x)$

$x+h$ is between the parenthesis. therefore it is the input! "$x+h$" must replace "x"

$$f(x+h) - f(x) = \overbrace{(x+h) - (x+h)^2}^{f(x+h)} - \overbrace{(x - x^2)}^{f(x)}$$

$f(x)$ is being subtracted. it has 2 terms.

$$= x + h - (x^2 + 2xh + h^2) - x + x^2$$

Subtracting 3 terms.

$$= x + h - x^2 - 2xh - h^2 - x + x^2$$

$$= h - 2xh - h^2$$

$$= \boxed{h(1 - 2x - h)}$$

2. Rationalize the denominator:

$$\frac{2}{\sqrt{3+x}}$$

one factor rationalizing problem.

$$\frac{2}{\sqrt{3+x}} \cdot \frac{\sqrt{3+x}}{\sqrt{3+x}} = \frac{2\sqrt{3+x}}{(\sqrt{3+x})^2}$$

$$= \boxed{\frac{2\sqrt{3+x}}{3+x}}$$

3. Completely simplify (remember, write as one fraction only) the expression

missing factor
$(x+2)$ $\longrightarrow$

$$\frac{2}{(x-1)^2(x+2)} - \frac{2}{(x-1)(x+2)^2}$$ $\longleftarrow$ missing factor $(x-1)$

$$= \frac{(x+2)}{(x+2)} \cdot \frac{2}{(x-1)^2(x+2)} - \frac{2}{(x-1)(x+2)^2} \cdot \frac{(x-1)}{(x-1)}$$ introduce missing factors

terms are subproblems.

$$= \frac{2(x+2)}{(x-1)^2(x+2)^2} - \frac{2(x-1)}{(x-1)^2(x+2)^2}$$

subtracting 2 terms.

$$= \frac{2x+4}{(x-1)^2(x+2)^2} - \frac{2x-2}{(x-1)^2(x+2)^2} = \frac{2x+4 - (2x-2)}{(x-1)^2(x+2)^2}$$

$$= \frac{2x+4-2x+2}{(x-1)^2(x+2)^2} = \boxed{\frac{6}{(x-1)^2(x+2)^2}}$$

4. Completely factor the expression

$$-x^4 - 2x^3 - x^2$$
three terms

factor out $-x^2$
$\downarrow$

$$-x^4 - 2x^3 - x^2 = -x^2 \left(\overset{A^2}{x^2} + \overset{2AB}{2x} + \overset{B^2}{1} \right)$$

$$= \boxed{-x^2 (x+1)^2}$$