MAT 142, Quiz #5, Spring 2017 Name KEY

Instructions: Show all work. Give exact answers unless specifically asked to round.

1. Find and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = 2x^2$.

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

$$\frac{\cancel{2x^2}+4xh+2h^2-\cancel{2x^2}}{h} = \frac{4xh+2h^2}{h} = \frac{\cancel{h}(4x+2h)}{\cancel{h}}$$

$$= 4x+2h$$

2. Use long division to divide $\frac{6x^3+13x^2-11x-15}{3x^2-x-3}$. Write the result as $q(x)+\frac{r(x)}{d(x)}$.

$$\begin{array}{r} 2x+5 \\ 3x^2-x-3 \overline{)\,6x^3+13x^2-11x-15} \\ -\,6x^3+2x^2+6x \\ \hline 15x^2-5x-15 \\ 15x^2-5x-15 \\ \hline 0 \end{array}$$

$2x+5$

3. Use synthetic division to divide $\frac{x^5+x^3-2}{x-1}$. Write the result as $q(x)+\frac{r(x)}{d(x)}$.

$$\begin{array}{r} x^4+x^3+2x^2+2x+2 \\ x-1 \overline{)\,x^5+0x^4+x^3+0x^2+0x-2} \\ -x^5+x^4 \\ \hline x^4+x^3 \\ -x^4+x^3 \\ \hline 2x^3+0x^2 \\ -2x^3+2x^2 \\ \hline 2x^2+0x \\ -2x^2+2x \\ \hline \end{array}$$

$x^4+x^3+2x^2+2x+2$

$$\begin{array}{r} 2x-2 \\ -2x+2 \\ \hline 0 \end{array}$$

4. List all possible rational zeros of $f(x) = 2x^4 + 3x^3 - 11x^2 - 9x + 15$.

1, 3, 5, 15

1, 2

$\pm 1, \pm 3, \pm 5, \pm 15, \pm 1/2, \pm 3/2, \pm 5/2, \pm 15/2$