



MATH 140: WEEK-IN-REVIEW 9 (CHAPTERS 5.3, 5.4)

1. Find the domain of each of the following functions, using interval notation. Then classify each domain restriction as the location of a vertical asymptote or hole in the graph of the function.

(a) $f(x) = \frac{3x + 7}{2x - 5}$

(b) $g(x) = \frac{4(x + 4)}{(x + 4)(x - 3)}$



$$(c) h(x) = \frac{x(x+3)}{x^4 - 9x^2}$$



2. Determine the x and y intercepts of the following functions.

(a) $f(x) = \frac{(3x + 5)(x - 2)}{7(x + 4)}$

(b) $g(x) = \frac{2x^3 + 3x^2 - 2x}{x(x + 2)}$



3. Compute and simplify the following as a single rational expression.

(a) $\left(\frac{x-5}{x+3}\right) + 4\left(\frac{x+2}{x+3}\right)$

(b) $\frac{2x-3}{x-2} + \frac{x+3}{x+1}$

(c) $\frac{\left(\frac{x+1}{x}\right)}{\left(\frac{2x+1}{x-1}\right)}$



4. For each of the following compute and completely simplify the difference quotient.

(a) $f(x) = -2x^2 + 3x - 5$



(b) $g(x) = \frac{x + 4}{x - 3}$



(c) $h(x) = \sqrt{3 - 2x}$



5. Classify each of the following functions as a polynomial function (state its degree and leading coefficient), power function, rational function, or none of these (and explain why not).

(a) $f(x) = \pi + x^3 - 4x^4$

(b) $h(z) = \frac{5z^2 - 12z}{2 + 3z^4}$

(c) $g(r) = \sqrt{6r^7}$

(d) $m(x) = 1 + 3x^2 + 5x^{2/3} - 9x^7$

(e) $k(w) = \frac{w\sqrt[7]{w}}{w^2 - 4}$

(f) $f(x) = \left(\frac{1}{3}\right)^x$



6. Rewrite each radical in its equivalent exponential (power) form, assuming x is in the domain of each function

(a) $\sqrt[7]{3x^2 + 5x}$

(b) $12\sqrt{5x^2 + 3x - 7}$

(c) $\sqrt[4]{(4 - 5x)^5}$

(d) $\left(\sqrt[3]{3x^2 + 5x - 2}\right)^7$



7. Rewrite each exponent function in its equivalent radical form, assuming x is in the domain of each function.

(a) $(x^2 + 2x)^{5/9}$

(b) $(5x + 10)^{4/5}$

(c) $3(5x - 2)^{7/2}$

(d) $-5 \cdot (4x^2 + 1)^{-9/4}$



8. State the domain of each function. Write your answer using interval notation. Then determine the x and y intercepts if possible.

(a) $f(x) = \sqrt[4]{3x - 27}$

(b) $g(x) = 2\sqrt[3]{x - 8}$

(c) $h(x) = 5(2x + 16)^{3/4}$



9. State the domain of each function using interval notation.

(a) $f(x) = (5x - 6)^{-4/3}$

(b) $h(x) = \frac{\sqrt{x+3}}{6\sqrt[3]{x+3}}$

(c) $g(r) = \frac{5r}{\sqrt{r+3}-4}$



10. Rationalize each numerator or denominator, as appropriate, and simplify the expression.

(a) $\frac{x - 9}{\sqrt{x} - 3}$

(b) $\frac{5 + \sqrt{x}}{x - 1}$

(c) $\frac{\sqrt{x + h + 1} - \sqrt{x + 1}}{h}$