

Show all work neatly for partial credit

1. Given: $f(x) = x^5 - x^4 + x^3 - x^2 + x - 1$. Apply Descartes' Rule of Signs to determine how many positive (8) and how many negative real zeros this polynomial function has.

positive _____

negative _____

2. **List** all possible rational roots of $f(x) = 2x^5 - x^3 + 2x^2 + 12$. (6)

3. Given that $x = -2$ is a root of $f(x)$, find all roots of $f(x) = x^3 + 5x^2 + 5x - 2$. Leave answers in **exact** (6) form. Show all work.

4. Write a fourth degree polynomial with integer coefficients having 0, 3, $-2i$ as zeros. (5)

5. Find all zeros and factor over the reals

(7) $f(x) = 4x^5 - 8x^4 - x + 2$

6. Identify the conic each equation describes

(15)

(a) $4x^2 - y^2 - 24x - 4y + 16 = 0$

(b) $2x^2 + 3y^2 - 8x + 6y + 5 = 0$

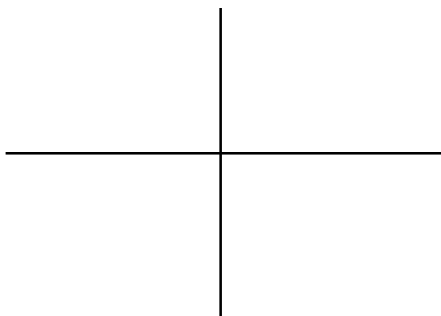
(c) $x^2 - 4y + 8x + 8 = 0$

(d) $4y^2 + 3x - 16y + 19 = 0$

(e) $2x^2 + 2y^2 - 12x + 8y - 24 = 0$

7. Write an equation for an ellipse with foci at $(-4,2)$ and $(-4,8)$ with vertex $(-4,10)$. Graph the ellipse.

(10)



equation: _____

8. Use interval notation to express the domain of each function.

(9)

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

(b) $g(x) = \sqrt{3x - 12}$

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

9. (a) **Set up only** the first step to use for partial fraction decomposition.

(6)

$$\frac{10x^2 + 2x}{(x - 1)^2(x^2 + 2)}$$

(10) (b) Find the partial fraction decomposition. Follow through completely, solve for A , B , C , etc.

$$\frac{x + 2}{x^3 - 2x^2 + x}$$

10. Given the rational function $f(x) = \frac{x-1}{x^2-4}$

(6) (a) find the x and y intercepts of f .

x _____

y _____

(6) (b) find the horizontal and vertical asymptotes of f .

horizontal asymptotes _____

vertical asymptotes _____

(6) (c) Sketch the graph of f , labeling any extra points you use.

