

Exam #3

November 14, 2017

Name _____

- You will be told when to begin the work and when to terminate work on the examination. You must stop when instructed. Points may be deducted in case of violations.
- Please show your work to support your answers that require calculations. Correct but unsupported answers may not be given full credit.
- The use of a cell phone or other electronic communication devices during the examination is not allowed. The exam will be canceled and a grade of “0” will be assigned to anyone who uses a cell phone during the examination or if one is found within hands reach.
- Calculators are not allowed on this exam.
- The exam consists of two parts. Part I contains five multiple choice questions worth 5 points each if not stated otherwise. Part II contains 7 open ended questions worth 10 points each if not stated otherwise.

Honor Code: *On my honor, I have neither received nor given any aid during this examination.*

Signature: _____

Part I

Choose your answer from five available choices. No partial credit will be given for wrong answers.

1. Which of the following functions are rational functions

• $f(x) = \frac{x^2 - x}{x}$

• $g(x) = \frac{2 - x}{\sqrt{x - 1}}$

• $h(x) = \frac{2x^{1/2} - 5}{3x + 1}$

• $k(x) = \frac{x + 4}{x^2 + 2x + 3}$

- (a) $f, g,$ and k
- (b) f only
- (c) f and k
- (d) $f, h,$ and k
- (e) None of the above

2. The parabola $y = -2(x + 1)^2 + 3$ has the vertex at

- (a) (1,3)
- (b) (-1,3)
- (c) (-1,-3)
- (d) (1,-3)
- (e) None of the above

3. Find the domain of $f(x) = \sqrt{1 - x}$.

- (a) $(-\infty, 1]$
- (b) $(-\infty, 1)$
- (c) $(-1, \infty)$
- (d) $[-1, \infty)$
- (e) None of the above

4. Find the vertical asymptote(s) of the rational function

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

- (a) $y = 2$ and $y = -3$
- (b) $x = 2$ and $x = -3$
- (c) $y = 2$
- (d) $x = -3$
- (e) None of the above

5. Match each function with its horizontal asymptote(if it exists). [Hint: One asymptote can be used multiple times.]

(a) $f(x) = \frac{x - 3}{x^2 + 1}$

(b) $g(x) = \frac{6x^2}{2 - 3x^2}$

(c) $h(x) = \frac{8x^3 - 2x^2 + x}{4x^3 + x^2 + 4}$

(d) $k(x) = \frac{x^2 + x}{4x}$

(1) $y = 0$

(2) $y = 1$

(3) $y = -1$

(4) $y = 2$

(5) $y = -2$

(6) no horizontal asymptote

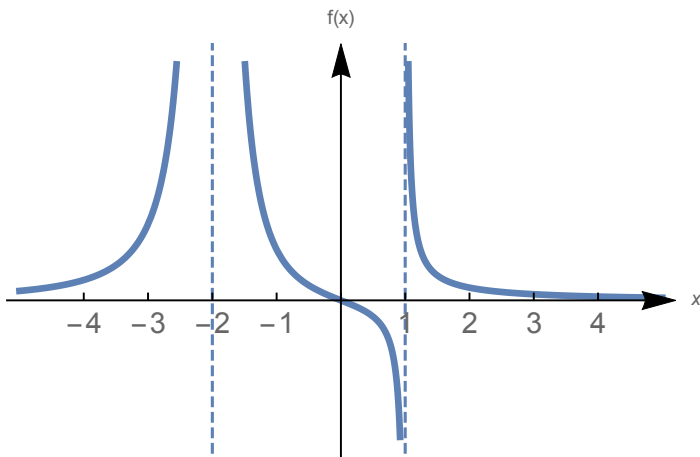
Part II

6. (10 points each) Solve the following inequality.

(a) $(x - 9)(x + 2) > 0$

(b) $x^2 \leq 2x + 2$

7. (5 points) Use the graph below to solve the inequality, $f(x) \geq 0$.



8. Write an equation in standard form of the parabola that has the same shape as the graph of $f(x) = 6x^2$ or $g(x) = -6x^2$, but with has the maximum = 8 at $x = -6$.

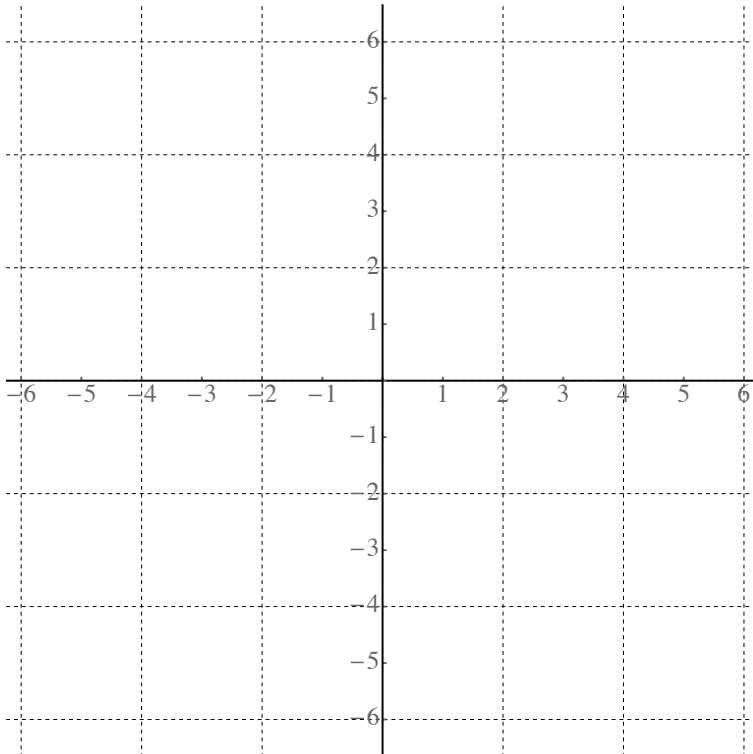
9. Find the equation (in standard form) of the parabola with the vertex at $(2, -6)$ and the y-intercept at $(0, -2)$

10. Solve the inequality.

$$\frac{x^2 + 1}{2x^2 + 10x + 8} \leq 0$$

11. Find the equation of the parabola in the standard form. Graph the parabola with x-intercepts and find its vertex.

$$f(x) = x^2 + 6x + 5$$



12. (20 points) Graph the function $f(x) = \frac{x^2 - x - 2}{x^2 - 4}$

(a) Domain

(b) y-intercept

(c) x-intercept

(d) Vertical asymptote(s)

(e) Horizontal asymptote(s)

(f) Symmetries

(g) Sign chart

(h) Graph

