

NOTE: You will be allowed a calculator for application problems only during the exam. All work must be shown in order to earn any points on the exam. Further, while this review is a largely comprehensive refresher of what we've gone over so far, and I largely base my exams off of the reviews I give, the exam could still have problems which are pulled from any part of the lessons/homework/worksheets we've done this term.

1. Factor out the greatest common factors from the following polynomials.

a.  $45 - 54x$

c.  $-40x^4 - 48x^5 - 88x^7$

b.  $30t^3 - 48t^4 + 24t^2$

d.  $30t^7(t-3)^2 - 60t^3(t-3)^3 + 75t^5(t-3)^2(t+1)$

2. Use grouping to factor the following polynomials.

a.  $2x^2 - 8x + 3x - 12$

c.  $6x^2 + 2x - 3x - 1$

b.  $-2x^3 + x^2 + 6x - 3$

d.  $x^2 + 3x - xy - 3y$

3. Factor the following trinomials.

a.  $r^2 - 3r - 28$

e.  $4r^2 + 8ry - 5y^2$

b.  $x^2 + 2x - 24$

f.  $x^2 - 4y^2$

c.  $6x^2 + 15x - 9$

g.  $2x^2 - 11xy + 12y^2$

d.  $8y^2 - 46y + 45$

h.  $8x^2 - 12xy - 108y^2$

4. Factor the following special polynomials.

a.  $9x^4 - 36$

b.  $9x^2 + 12x + 4$

5. Completely factor the following polynomials using whatever method is necessary.

a.  $-x^3 - x^2 + 9x + 9$

d.  $x^2 + 2x - 48$

b.  $16x^3r^5 - 48x^5r^3 - 64x^3r^4$

e.  $8y^5 - 48y^4 + 64y^3$

c.  $6x^2 + 23x + 20$

f.  $2x^3 - 5x^2 + 12x^2 - 30x + 18x - 45$

6. Solve the following quadratic equations using the zero-product-principle.

a.  $(2x - 4)(3x + 7) = 0$

c.  $x^2 = -8x - 15$

b.  $3x^2 + 14x - 24 = 0$

d.  $2x^2 + x + 2 = 2(4x + 3)$

7. Suppose that the sum of two numbers is  $-50$  while their product is  $-216$ . Determine the two numbers.

8. A triangle's base is 10 cm less than twice its height, while its area is  $24 \text{ cm}^2$ . Determine the length of the base and the height of the triangle.

9. Evaluate the function  $f(x) = -\frac{x+2}{x^2-5x-6}$  at the given values.

a.  $f(0)$

b.  $f(2)$

c.  $f(-1)$

10. Let  $g(x) = 2x^2 + 13x + 15$ . Evaluate and solve the following as indicated. State your answer using formal notation as per the notation standards.

a.  $g(0)$

b.  $g\left(-\frac{3}{2}\right)$

c. Solve  $g(x) = 0$ .

11. Let  $h(t) = 2$ . Evaluate and solve the following as indicated. State your answer using formal notation as per the notation standards.

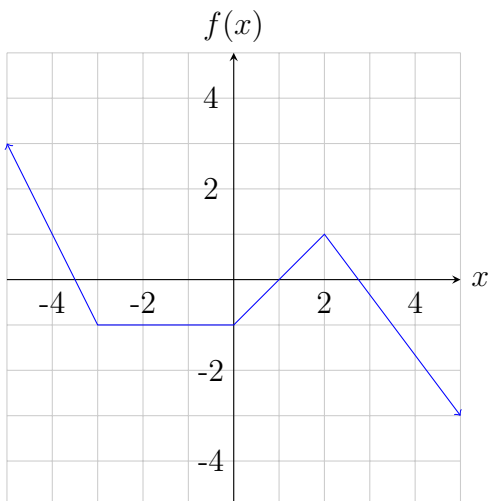
a.  $h(-3)$

b.  $h(2)$

c. Solve  $h(t) = -7$ .

d. Solve  $h(t) = 2$ .

12. Given the function  $f$ , shown in the graph below, evaluate or solve as indicated. Use formal notation as per the notation packet.



a.  $f(0)$

b.  $f(-1)$

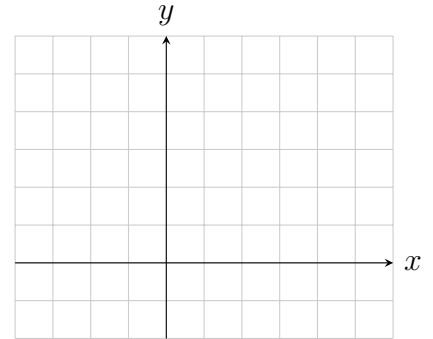
c.  $f(x) = 1$

d.  $f(x) = 0$

13. Suppose the function,  $H$ , subtracts the input from 5 and then takes the square root of that in order to obtain the output.

a. Give a numeric description of  $H$ .      b. Give a symbolic description of  $H$ .

c. Give a visual description of  $H$ .



d. What is  $H(4)$ ?

e. Solve  $H(x) = 2$ .

f. What is the domain and range of  $H$ ?

14. Let  $s(t) = 12t^2 + 28t + 15$ , where  $s$  is the position (in miles) of a car driving on a straight road at time  $t$  (in hours). The car's velocity (in miles per hour) at time  $t$  is given by  $v(t) = 24t + 28$ .

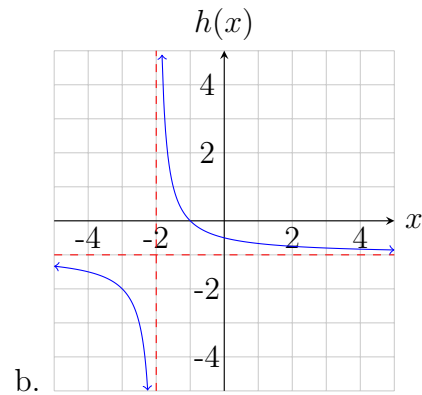
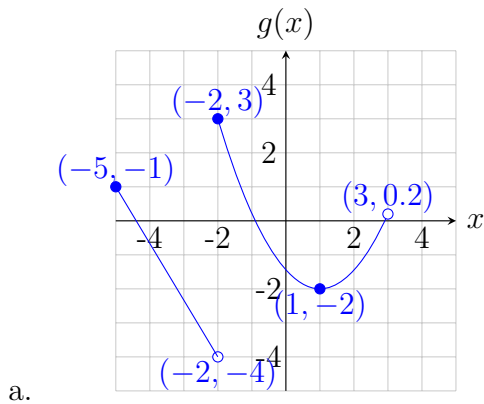
a. Using function notation, express the car's position after 2.5 hours.

c. Use function notation to express the question, "When is the car going 64 miles per hour?"

b. Where is the car 2.5 hours into its drive?

d. Where is the car when it is going 64 miles per hour?

15. Given the following functions, determine their domain and range. State your answers in both interval and set notation per the notation standards.



16. Determine the domain of the following functions.

a.  $K(x) = -\frac{2x + 13}{3x^2 - 10x + 8}$

c.  $H(t) = \frac{\sqrt{x + 3}}{3x - 6}$

b.  $k(t) = \sqrt{5 - 3x}$

d.  $f(t) = -\frac{5}{\sqrt{2x + 7}}$

17. You are fencing a rectangular section of your property next to a river and you have purchased 200 meters of fencing (you are not going to fence the side with the river). Determine a function which models the area of the fenced in land. What is the domain and range of this function and what is the maximum area you could have for the rectangle?