

Algebra 2 Last mid-term Review

1. Solve the following system algebraically: $x^2 + x - y = -1$

$x + y = 4$

$x^2 + x + 1 = y$
 $y = -x + 4$

$x^2 + x + 1 = -x + 4$
 $+x - 4 \quad +x - 4$

$x^2 + 2x - 3 = 0$
 $(x+3)(x-1) = 0$

$x = -3 \quad x = 1$

$-3 + y = 4$

$y = 7$ (-3, 7)

$1 + y = 4$

$y = 3$ (1, 3)

(4 checks!) origin symmetry

2. Determine whether the function is even, odd, or neither:

a) $f(x) = -x^4 + 6x^2 - 13$

b) $g(x) = x^3 - 12x$

$f(-x) = -(-x)^4 + 6(-x)^2 - 13$
 $= -x^4 + 6x^2 - 13$

y-axis symmetry

Since $f(x) = f(-x)$

even

$g(-x) = (-x)^3 - 12(-x)$
 $= -x^3 + 12x$

$-g(x) = -(x^3 - 12x)$
 $= -x^3 + 12x$

since $g(x) = -g(x)$

odd

3. Convert the quadratic equation into vertex form: $y = x^2 - 10x + 6$

$y - 6 + 25 = x^2 - 10x + 25$ $\frac{-6}{-6}$

$y + 19 = (x - 5)^2$

$y = (x - 5)^2 - 19$

V: (5, -19)

DOTS

4. Factor completely: a) $4x^3 - 16x^2 - 9x + 36$

Group

$4x^2(x - 4) - 9(x - 4)$

$(4x^2 - 9)(x - 4)$

$(2x + 3)(2x - 3)(x - 4)$

b) $81a^4 - 256$

$(9a^2 - 16)(9a^2 + 16)$

$(3a + 4)(3a - 4)(9a^2 + 16)$

5. Simplify: $\sqrt{-96}$

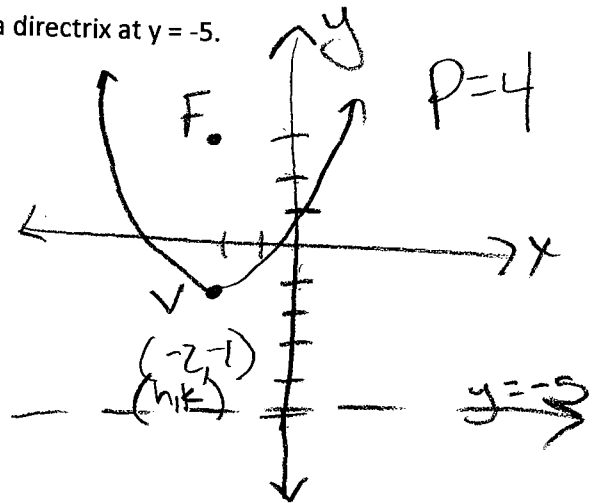
$i \cdot \sqrt{16} \cdot \sqrt{6}$
 $4i \cdot \sqrt{6}$

$= 4i\sqrt{6}$

6. Write the equation of the parabola with a focus at $(-2, 3)$ and a directrix at $y = -5$.

$$y = \frac{1}{4(4)}(x - (-2))^2 - 1$$

$$y = \frac{1}{16}(x+2)^2 - 1$$



7. Is $(x+1)$ a factor of $f(x) = 4x^3 - 21x^2 - 17x + 34$?

$$\begin{array}{r|rrrr} -1 & 4 & -21 & -17 & 34 \\ & \downarrow & -4 & 25 & -34 \\ \hline & 4 & -25 & 34 & 0 \end{array}$$

yes, b/c there is no remainder

What are all the roots of this equation?

$$4x^2 - 25x + 34 = 0$$

$$x = \frac{25 \pm \sqrt{(-25)^2 - (4 \cdot 34)}}{4(4)} = \frac{25 \pm \sqrt{81}}{16}$$

$$\begin{aligned} \frac{25+9}{16} &= 2.125 \\ &\text{OR } \frac{17}{8} \\ \frac{25-9}{16} &= 1 \end{aligned}$$

$$x = -1, 1, 2.125$$

8. Solve: $\frac{3x(2x)}{x+1} = \frac{5(x+1)}{2x(x+1)}$

check

$$\left[\frac{6x^2}{2x(x+1)} = \frac{5x+5}{2x(x+1)} \right]$$

$$\begin{array}{r} 6x^2 - 5x - 5 = 3x + 3 \\ -3x - 3 \quad -3x - 3 \\ \hline 6x^2 - 8x - 8 = 0 \end{array}$$

$$\frac{6x^2 - 8x - 8}{2} = 0$$

$$3x^2 - 4x - 4 = 0$$

$$x = \frac{4 \pm \sqrt{(-4)^2 - (4 \cdot 3 \cdot -4)}}{2(3)}$$

$$x = \frac{4 \pm \sqrt{64}}{6}$$

$$x = \frac{4 \pm 8}{6} \begin{aligned} &\left(\frac{12}{6} = 2 \right) \\ &\left(\frac{-4}{6} = -\frac{2}{3} \right) \end{aligned}$$

9. A baseball follows the path with the equation $f(x) = -16t^2 + 32t + 4$. What is the maximum height it reaches?
How long is the ball in the air?

$$x = \frac{-b}{2a} = \frac{-32}{2(-16)} = 1$$

$$f(1) = -16(1)^2 + 32(1) + 4 = \boxed{20}$$

$$0 = -16t^2 + 32t + 4$$

$$t = \frac{-32 \pm \sqrt{32^2 - (4 \cdot -16 \cdot 4)}}{2(-16)}$$

$$t = \frac{-32 \pm \sqrt{1280}}{-32}$$

reject -12

$\boxed{2.12}$

10. What are the equations of the asymptotes of $y = \frac{x+3}{x-5}$?

$$1 + \frac{8}{x-5}$$

$$\begin{array}{r} x-5 \overline{) x+3} \\ \underline{-(x-5)} \\ 8 \end{array}$$

$$y = \frac{8}{x-5} + 1$$

$$\boxed{\begin{array}{l} \text{VA: } x=5 \\ \text{HA: } y=1 \end{array}}$$

