SGO Review

AK

2. Factor $x^3 - 3x^2 - 4x + 12$ completely.

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

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

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

3. Factor $16x^3 + 54$ completely.

$2(8x^3+27)$

$2(2x+3)(4x^2-6x+9)$

4. Factor $24x(3-4x)^2 - 8x^2(3-4x)(5x-1)$ completely.

$8x(3-4x)(3(3-4x) - x(5x-1))$

$(9 - 12x - 5x^2 + x)$

$8x(3-4x)(-5x^2-11x+9)$

$-8x(3-4x)(5x^2+11x-9)$

3. $\left(4x^2\right)^{\frac{3}{2}} = \left(2x^2-6x\right)^{\frac{2}{3}\cdot\frac{3}{2}}$

$8x^3 = 2x^2 - 6x$

$8x^3 - 2x^2 + 6x = 0$

$2x(4x^2 - x + 3) = 0$

$2x(4x^2 - 4x + 3x - 3) = 0$

$4x(x-1) + 3(x-1) = 0$

$(4x+3)(x-1) = 0$

$x = 0, \quad x = \frac{1 \pm \sqrt{1-4(4)(3)}}{8}$

$x = \frac{1 \pm \sqrt{-47}}{8}$

$x = \frac{1 \pm i\sqrt{47}}{8}$

4. $x^{\frac{2}{3}} - 6x^{\frac{1}{3}} = 7$

$x^{2/3} - 6x^{1/3} - 7 = 0$

$(x^{1/3} - 7)(x^{1/3} + 1) = 0$

$x^{1/3} = 7 \qquad x^{1/3} = -1$

$x = 7^3 \qquad x = -1$

5. $\sqrt{x+1} + \sqrt{x} = 9$

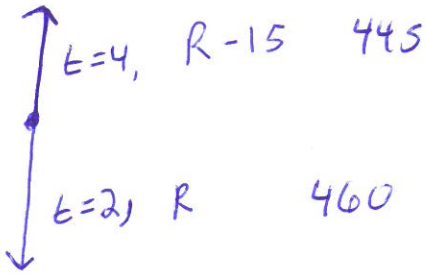
$(\sqrt{x+1})^2 = (9 - \sqrt{x})^2$

$x + 1 = 81 - 18\sqrt{x} + x$

$\frac{-80}{-18} = \frac{-18\sqrt{x}}{-18}$

$\left(\frac{40}{9}\right)^2 = \sqrt{x}^2$

$\frac{1600}{81} = x$



Two airplanes leave the same airport. The first plane left at 8:00 am and flew due north, and the later plane flew due south leaving at 10:00 am. The northbound plane is flying 15 miles per hour slower than the southbound one. If at noon, they are 2700 miles apart, how fast was the northbound plane traveling? (4pts)

445 mph

$D_N + D_S = 2700$

$4(R-15) + 2(R) = 2700$

$4R + 2R - 60 = 2700$

$+60 \quad +60$

$\frac{6R}{6} = \frac{2760}{6} = 460$

You just bought an exotic fish. The water in your aquarium needs to be 8% saltwater. In the aquarium, you currently have 100 gallons of 40% saltwater. How much fresh water do you need to add to the tank to get the water quality back to 8% saltwater? (4pts)

$\frac{40}{100+x} = .08$

$8 + .08x = 40$

$\frac{.08x}{.08} = \frac{32}{.08}$

$x = 400$

Natalie, the best diver on the RHS Swim team, has her path described by the equation:

$$y = \frac{-4}{9}x^2 + \frac{24}{9}x + 12$$

where y is her height above the water (in feet) and x is her horizontal distance from the edge of the diving board (in feet).

a) How high is the diving board above the water?

12 ft

b) How far horizontally is Natalie from the diving board when she reaches her maximum height?

$-b \div 2a = -\frac{24}{4} \cdot \frac{9}{-4 \cdot 2} = \frac{6}{2} = 3$

3 ft

c) What is her maximum height?

16 ft

$y = \frac{-4}{9}(3)^2 + \frac{24}{9}(3) + 12$

$-4 + 8 + 12$

Given: $f(x) = x^5 + 2x^4 + x^3 + 2x^2 - 12x - 24$ has a zero of $2i$ and at least one negative rational zero.

$2i, -2i, \sqrt{3}, -\sqrt{3}, -2$

a. Find the remaining zeros.

$(x-2i)(x+2i) = x^2+4$

$$x^2+4 \overline{)\, x^5+2x^4+x^3+2x^2-12x-24}$$

x^3+2x^2-3x-6

$x^5 \quad +4x^3$

$2x^4-3x^3+2x^2-12x-24$

$2x^4 \quad +8x^2$

$-3x^3-6x^2-12x-24$

$-3x^3 \quad -12x$

$-6x^2-24$

$-6x^2-24$

0

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

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

$(x-\sqrt{3})(x+\sqrt{3})(x+2)$