1. Simplify each of the following expressions.

   a) $\dfrac{-5^2 - 60 \div (-4) \cdot 3}{|-21 \div (-7)| - (-1)^6}$

   b) $\dfrac{\frac{1}{5} + \left(-\frac{1}{2}\right)^2 \cdot \left(3\frac{2}{5}\right)}{\frac{1}{5} + \frac{1}{2}} - 2^{-1}$

   c) $5\sqrt{18a^5} - 7\sqrt{32a^5} + 4\sqrt{50a^5}$

   d) $\dfrac{x^3 \left(-2x^3y^{-2}\right)^4 2yx^{-1} \left(-12xy^{-3}x^{-2}\right)^{-1}}{x^{-3}yx^3y^0 \left(-3x^{-5}y\right)^{-2} y^{-3}}$

   e) $\dfrac{a^{2/3}\left(b^{-4/3}\right)^2}{\left(ab^2\right)^{-1/3}}$

   f) $\dfrac{x^2 - 4x - 21}{x^2 - 49} \div \dfrac{8x + x^2 + 15}{2x + x^2 - 35}$

   g) $\dfrac{2a - \frac{1}{8a}}{4 + \frac{1}{a}}$

   h) $\dfrac{x-5}{x+2} - \dfrac{3}{2-x} - \dfrac{14-x}{x^2-4}$

   i) $(3x-1)\left(3x + 9x^2 + 1\right)$

   j) Rationalize the denominator in $\dfrac{2}{\sqrt{17}+4}$

   k) Rationalize the denominator in $\dfrac{2}{\sqrt{x}+4}$

   l) $(3 - 5i)(4 - i)$

   m) $\left(2 - \sqrt{-9}\right)\left(2 + \sqrt{-1}\right)$

   n) i^{38}

   o) $\dfrac{-18 + 13i}{i - 4}$

2. Solve each of the following equations. Make sure to check your solution(s).

   a) $\dfrac{3x-1}{4} + \dfrac{8-4x}{3} = 2x + 5$

   b) $\sqrt{5x-4} - 3 = 8$

   c) $2x^2 + x^3 = 2x$

   e) $\sqrt{2x-1} + 4 = 1$

   f) $4 - (2x-5)(x+1) = 18 - 2x^2$

3. Factor completely over the complex numbers.

   a) $3x^2 - 7x - 1$ b) $7x^2 - 10x + 16$

4. Graph the parabola $y = 6x - x^2 + 1$. Clearly indicate the coordinates of at least five points, including vertex and intercepts.

5. Word Problems

   (a) One side of a rectangle is 8 in longer than three times the other side. The area of the rectangle is 315 in^2. Find the sides.

   (b) The hypotenuse of a right triangle is 74 ft. The difference between the other two sides is 46 ft. Find the sides of the triangle.

   (c) One side of a rectangle is 7 cm shorter than five times the other side. Find the length of the sides if the area of the rectangle is 528 cm^2.

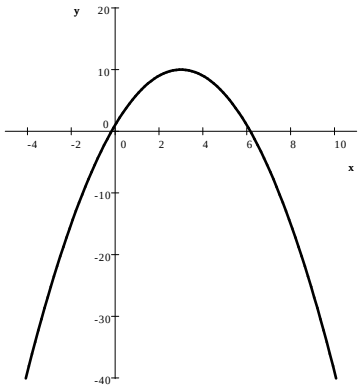
© copyright Hidegkuti, Powell, 2009

(d) How many gallons of a 9% acid solution must be mixed with 15 gallons of a 30% acid solution to obtain an acid solution that is 24%?

(e) A bicycle leaves Chicago, heading West at $15\frac{\text{mi}}{\text{h}}$. Four hours later, a car leaves Chicago, heading West at $45\frac{\text{mi}}{\text{h}}$. How long will it take for the car to overtake the bicycle?

Answers

1. a) 10 b) 1 c) $7a^2\sqrt{2a}$ d) $-24x^5$ e) ab^2 f) $\dfrac{x-5}{x+5}$ g) $\dfrac{4a-1}{8}$ h) $\dfrac{x-1}{x+2}$
   i) $27x^3-1$ j) $2\sqrt{17}-8$ k) $\dfrac{2\sqrt{x}-8}{x-16}$ l) $7-23i$ m) $7-4i$ n) $5-2i$
2. a) -1 b) 25 c) $0, -1+\sqrt{3}, -1-\sqrt{3}$ d) no solution e) 3
3. a) $3\left(x-\dfrac{7+\sqrt{61}}{6}\right)\left(x-\dfrac{7-\sqrt{61}}{6}\right)$ b) $7\left(x-\dfrac{5+\sqrt{87}i}{7}\right)\left(x-\dfrac{5-\sqrt{87}i}{7}\right)$
4. y-intercept: $(0,1)$ vertex: $(3,10)$ x-intercepts: $\left(3-\sqrt{10},0\right)$ and $\left(3+\sqrt{10},0\right)$



5. a) 9 in by 35 in b) 24 ft, 70 ft, 74 ft c) 11 cm by 48 cm
   d) 6 gallons of 9% solution with 15 gallons of 30% solution e) 2 hours

© copyright Hidegkuti, Powell, 2009