Practice Exam 3

1. Solve the following quadratic equations:

a) $x^2 - 16 = 0$ **b)** $x^2 + 16 = 0$ **c)** $x^2 - 8 = 0$ **d)** $-3x^2 + x = 0$ **e)** $x^2 - \dfrac{x}{4} = 0$

f) $2013\, x^2 + 2014 = 0$ **g)** $\pi x^2 - 1 = 0$ **h)** $\sqrt{2}\, x^2 + \pi x = 0$

2. Solve the following quadratic equations:

a) $x^2 + 3x - 4 = 0$ **b)** $x^2 + 6x + 9 = 0$ **c)** $x^2 + 6x - 9 = 0$ **d)** $x^2 + 2x - 2 = 0$

e) $3x^2 - x - 2 = 0$ **f)** $x^2 + x + 2 = 0$ **g)** $-x^2 + 3x - 2 = 0$

3. Factor the quadratic polynomials from problem **2**.

4. Compose a quadratic equation whose roots are

a) 2 and -4 **b)** -5 (a double root)   **c)** $\sqrt{5}$ and $-\sqrt{5}$.

5. For the parabolas defined by the following equations, find the vertex, the axis of symmetry, the intercepts, and draw the graphs.

a) $y = x^2 + 2x - 3$ **b)** $y = -x^2 - 4x$ **c)** $y = 2x^2 - 2x + 4$ **d)** $y = -x^2 + 1$ **e)** $y = x^2 - 4x + 4$

f) $y = -\dfrac{1}{3}x^2$

6. Let $p(x) = x^2 - 3x + 1$ and $q(x) = x^3 + 2$ be polynomials. Determine the degrees of p and q. Find

a) $p + q$ **b)** $p(-1) + 3q(2)$ **c)** $2p - q$ **d)** pq **e)** $\dfrac{p(x+1)}{2q(0)}$

7. Solve the following equations

a) $x^3 + x^2 = x$ **b)** $x^4 = 49x^2$

8. Simplify the following expressions and find their domains.

a) $\dfrac{x^3 - x}{x^5 - x^3}$ **b)** $\dfrac{x^2 - 1}{x^2 + 7x + 6}$ **c)** $\dfrac{36 - x^2}{2x + 12}$ **d)** $\dfrac{x^2 + 6x + 9}{x^2 + x - 6}$ **e)** $\dfrac{3x - 15}{4x^2 - 2x} \cdot \dfrac{10x - 20x^2}{5 - x}$

9. In a right triangle with hypotenuse of 4 inches, one leg is 2 inches longer then the other. Find the lengths of the legs.

10. The Lazy Snail, a shipment company, calculates the total cost of shipments per day by the formula $y = \frac{1}{4}x^2 - 2x + 10$, where x is the number of shipped packages and y is the cost in dollars. Find the number of packages minimizing the cost of shipments per day. What is this minimal cost?