MIDTERM EXAM REVIEW PART 2

The best way to review for an exam is to practice problems. The problem set below covers a nice breadth of problems and has been chosen for a reason (make sure you are comfortable with these problems for the midterm.) Note that some are simply from the midyear review.

You now have a TON of problems and solutions to work from to help you study for the midterm. Be very comfortable with these problems, particularly the one's below and the one's from the 2012 midterm. Also, check my solutions that go along with this review packet. Work in groups during this period to work through these problems while checking the solutions as you go along. Email me with any questions this weekend! Good luck studying!

Part 1: Solve for x on each below. Leave EXACT answers (i.e. no decimals) (Note: Some of these are pulled right from the midyear review)

1.) $24x - x^3 = \frac{144}{x}$

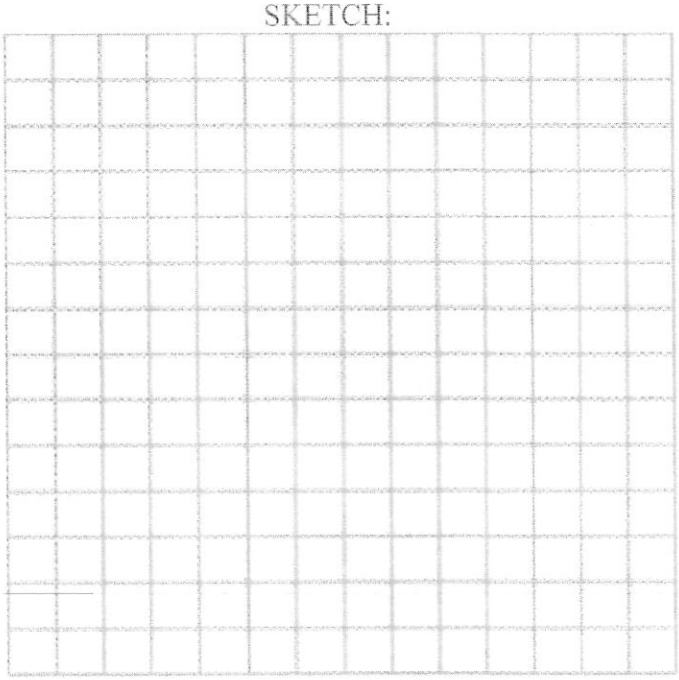
2. $\sqrt{x(8-x^3)} = \frac{4}{x}$

3.) $e^{2x} - 4e^x + 3 = 0$

2.) Sketch the graph of the rational function. Note any asymptotes, holes, intercepts etc. Also make a table of values indicating key points on the graph.

$$f(x) = \frac{x^3 - 2x^2 - 5x + 6}{x^2 + 3x + 2}$$

SKETCH:



3.) What minimum interest rate must be earned in order for an investment to quadruple in 30 years if the interest is being compounded daily.

4.) How many liters of a 20% alcohol solution must be mixed with 30 liters of a 80% solution to get a 40% solution?

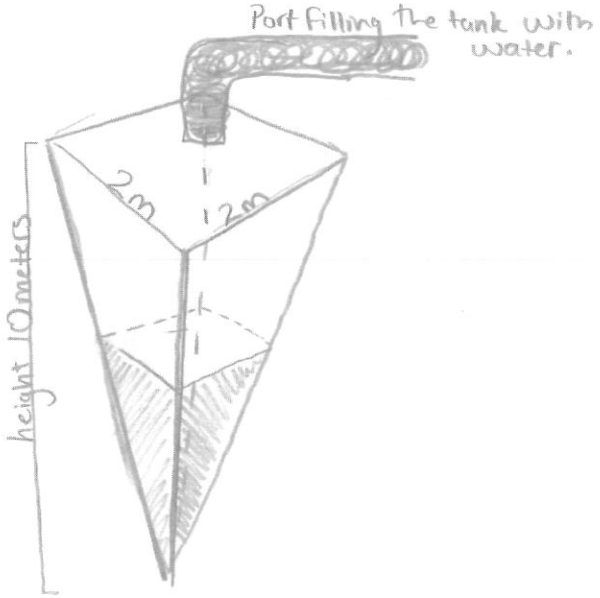
Finding the Inverse of a Quadratic Function

5.) Find the inverse of the function $f(x) = x^2 - 6x + 8$. Sketch f(x), its inverse, and the line $y = x$. Also, state the domain and range of the function and its inverse using bracket notation.

FUNCTION COMPOSITION MODELING PROBLEMS!

7.) A tank (shown below) in the shape of a square pyramid has the dimensions shown at right. The tank is filled with liquid via the fill port a rate of 6 liters/min (1 m^3 = 1000 liters). Find a formula for the height of liquid in the tank (measured from the bottom) as a function of time.

$V = \frac{1}{3}$ (Area of the base) · height



8.) A square has a side of length s and a diagonal of length d. (a) Express d as a function of s. (b) Express s as a function of d. (c) Express the area, A, of the square as a function of d.

Exponential Decay:

9.) A patient has accidentally inhaled a poisonous gas. 24 hours later he sees a doctor. From a blood sample, the concentration of the poison in the blood is 0.00372 mg per cm^3. On the second visit, 8 hours later, the concentration is 0.00219 mg/cm^3. Find an exponential function that models the decay of the toxin, and predict when the concentration will drop below 0.001 mg/cm^3.

10.) POLYNOMIALS: Find the zeros of the following rational function.

$h(x) = x^4 + 3x^3 - 25x^2 + 3x + 54$

11.) CONDITIONAL PROBABILITY: BAYES THEOREM

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Suppose that 12% of all NFL players use steroids, that a NFL player who uses steroids tests positive 97.5% of the time, and that a player who does not use steroids tests positive 3% of the time.

a.) What is the probability that an NFL player who tests positive for steroids actually uses steroids?

12.) Take the parent function of all cubic functions and apply the following transformations in the order shown. After applying the transformations, express the function in standard form,

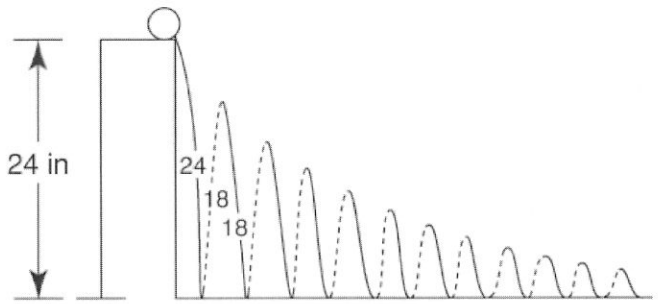
$f(x) = Ax^3 + Bx^2 + Cx + D.$

i. shift down by two units along the *y*-axis

ii. Then reflect across the *y*-axis

iii. Then shift right by 3 units

13.) A ball is dropped from a table that is twenty-four inches high. The ball always rebounds three fourths of the distance fallen. Approximately how far will the ball have traveled when it finally comes to rest?



14.) A man plans to save money in 2014 using the following plan. In the first week, he will deposit $5 into his savings account, in the second week, $15, and then $25 the next week and so on. He will deposit 10 more dollars than he did the previous week. He will do this for a full year (52 weeks). How much total money will he deposit into his account during the year?

CONFIDENCE INTERVALS:

15.) You are reporting for the Providence Journal and need to find the average number of minutes that high school students in Providence spend doing homework per school night. To do so you take a simple random sample of 150 Providence high school students. The average number of minutes spent doing homework is 47 minutes with a standard deviation of 13.8 minutes.

a.) Find a 95% confidence interval for the average number of minutes that Providence high school students spend doing homework per night? Show your work.

16.) You are doing a report to find the true percentage of Rhode Island residents that are Patriots fans. You take a simple random sample of 268 Rhode Island residents and 205 say that they are Patriots fans. Find a 95% confidence interval for the true percent of Rhode Island residents that are Patriots fans.