Mock Final Exam

The final exam will NOT look like this. The final exam is a selection of questions with more emphasis on material covered later in the course. This list contains one question for each category so that you can check what you are good at and what you need to practice more. The solutions are posted online.

1. Solve the following system of linear equations.

$$\begin{array}{rcrcl} 0.3x & + & 0.2y & = & -0.9 \\ 0.2x & - & 0.3y & = & -0.6 \end{array} \tag{1}$$

2. Two planes travel toward each other from cities that are 780 km apart at speeds of 190 and 200 km/h. They started at the same time. In how many hours will they meet?

3. Solve the following quadratic equation.

$$6y^2 - 2\sqrt{3}y - 1 = 0 \tag{2}$$

4. Solve the following exponential equation.

$$25^{3x-2} = 625^{2x+7} \tag{3}$$

5. Solve the following logarithmic equation.

$$\log_8(x+1) - \log_8 x = \log_8 4 \tag{4}$$

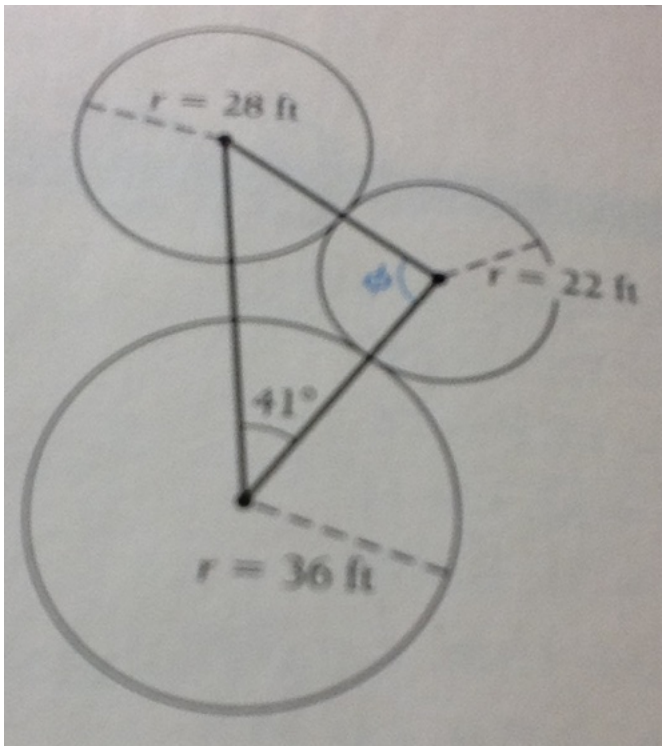
6. Solve the following trigonometric equation in $\{x \in \mathbb{R} | 0^\circ \leq x < 360^\circ\}$

$$\sin 2x \cos x - \sin x = 0 \tag{5}$$

7. What are slope and y-intercept of the curve corresponding to the following linear equation?

$$3x + y = \pi \tag{6}$$

8. Three circles are arranged as in the figure below. Find the angle ϕ. (The radius of the circles is $28, 22, 36$, respectively; the angle shown is $41°$.)



9. Simplify the following expression.

$$\sqrt{2x^2 - (x-5)(x+5) - 10x} \tag{7}$$

10. Identify the centre and the dimensions of the box for the following hyperbola:

$$\frac{1}{2}y^2 + \frac{5}{2} = x^2 + 6x + 5y \tag{8}$$

11. An airplane travels on a bearing of $100°$ at a 180 km/h airspeed while a wind is blowing 45 km/h from $220°$. Find the speed of the airplane over the ground and the direction of its track over the ground.

12. In professional tennis, there are about 600 challenges made to referee calls in single play during one year. 30% of challenges are upheld

with the call overturned, according to long years of experience. What approximately is the probability that this year between 175 and 200 challenges will be upheld, i.e. no fewer than 175 and no more than 200?

13. Based on a large data set, you conclude that the amount of sleep that you get at night is normally distributed with a mean of 8.09 hours and a standard deviation of 52 minutes. What is the probability that you will get less than 7 hours of sleep tonight?

14. Solve the following spherical triangles.

$$a = 67^\circ 19' 30'' \; b = 52^\circ 18' 20'' \; c = 37^\circ 13' 50'' \tag{9}$$

$$b = 21^\circ 30' 5'' \; B = 58^\circ 10' 15'' \; C = 90^\circ \tag{10}$$