Exam on Math Preliminaries – Answer Key

There are 3 sources that I recommend for reviewing the math.

1. Math Review notes posted on the course web page (source1)
2. Notes on Rates of Change posted on the course web page (source2)
3. Schaum's Outlines series: "Mathematical Methods for Business and Economics" (source3).

1. Solve the following system of equations.

$$3y - 2x = 11$$
$$y + 2x = 9$$

Method 1: notice that adding up the two equations will eliminate *x*.

$$4y = 20$$
$$y = 5$$

Substituting into the second equation give

$$5 + 2x = 9$$
$$2x = 4$$
$$x = 2$$

Method 2: substitution. From the second equation

$$y = 9 - 2x$$

Substitute this in the first one:

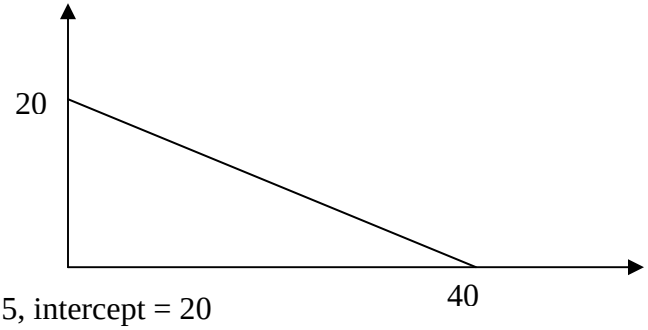
$$3(9 - 2x) - 2x = 11$$
$$27 - 6x - 2x = 11$$
$$8x = 16$$
$$x = 2$$

Then

$$y = 9 - 2 \cdot 2 = 5$$

To review equation solving see source3, chapter 4.

2. Plot the graph of $y = 20 - 0.5x$, and indicate the slope and the intercept of that function.



Slope = -0 .5, intercept = 20

To review equations and graphing see source1, section 2.2 and source 3, chapter 2.

3. $\frac{2}{3}+\frac{1}{4}=$

   a. $\frac{3}{7}$

   b. $\frac{2}{12}$

   c. $\frac{11}{12}$

   d. 1

To review fractions see source3, chapter 1.

4. $x^a x^b =$

   a. $x^a + x^b$

   b. x^{ab}

   c. x^{a+b}

   d. None of the above

5. $\frac{x^5}{x^3}=$

   a. x^{15}

   b. x^8

   c. $\frac{1}{x^2}$

   d. x^2

6. $\left(x^a\right)^b =$

   a. x^{a+b}

   b. x^{ab}

   c. $x^a x^b$

   d. None of the above

7. $\ln(x \cdot y) =$

   a. $\ln(x) + \ln(y)$

   b. $\ln(x^y)$

   c. $x\ln(y)$

   d. $y\ln(x)$

8. $\ln\left(x^a\right)=$

   a. $\ln a + \ln x$

   b. $a^2 + x^2 + 2ax$

   c. $a \cdot \exp(x)$

   d. $a\ln(x)$

9. $\ln\left(\frac{x}{y}\right) =$

a. $\ln(y) - \ln(x)$

b. $\ln(x) + \ln(y)$

c. $\ln(x) - \ln(y)$

d. $\frac{1}{y}\ln(x)$

To review exponential and logarithmic functions (questions 4-9) see source1 section 2.4, and source3 chapter 11.

10. Let $f(x) = x^a$. Then $f'(x) =$,

a. $\frac{x^a}{a}$

b. ax^{a-1}

c. a^x

d. x^2

Where $\left(f'(x) = \frac{df(x)}{dx} \right)$

11. Let $f(x) = a\ln(x)$. Then $f'(x)$,

a. $\frac{a}{x}$

b. ax^{a-1}

c. $\frac{x^a}{a}$

d. a^x

To review derivatives see source1, section 2.6 and source3, chapter 9.

12. How much is 25% out of 200?

$$25\% \cdot 200 = \frac{1}{4} \cdot 200 = 50$$

The above sources do not cover percentages. If you need a review come to my office.

13. Suppose that the price of a pair of shoes was \$60 in 2004 and the \$75 in 2005. What is the percentage increase in the price?

$$\frac{75-60}{60} = \frac{15}{60} = \frac{1}{4} = 25\%$$

To review rates of change see source2.