P221f07 paper homework pHW00: Mathematics Quiz
(due 8/31/07, 6pm)

This practice quiz will give you an indication of the math skills (in trigonometry, algebra, and calculus), required to do well in P221. These exercises should be easy (some very easy!). If not, dust off the old textbooks and review! We need to be able to concentrate on learning physics in this class, while using math as a tool.

1. Trig functions, radians to degrees and vice versa. Make sure that you can work with either. You should know many of these without looking them up. Remember the unit circle!
   a) $90^\circ = \text{ ___ radians}$
   b) $255^\circ = \text{ ___ radians}$
   c) $0.45 \text{ radians} = \text{ ___ }^\circ$
   d) $\pi/4 \text{ radians} = \text{ ___ }^\circ$
   e) $\sin \pi/4 = \text{ ___}$
   f) $\cos 30^\circ = \text{ ___}$
   g) $\tan 0^\circ = \text{ ___}$
   h) $\sin^{-1} (1) = \text{ ___ }^\circ$
   i) $\cos^{-1} (0.707) = \text{ ___ radians}$
   j) $\tan^{-1} (0.5) = \text{ ___ }^\circ$

2. Refer to the sketch of the right triangle with sides A, B, C and angles a, b, and a right angle. It is not drawn to scale.
   a) $A = 3.0, B = 2.0, C = \text{ ___}$
   b) $A = 1.5, C = 2.5, B = \text{ ___}$
   c) $C = 4.5, a = 55^\circ, A = \text{ ___}$
   d) $a = 65^\circ, b = \text{ ___ }^\circ$

3. An observer, whose eyes are 1.83m above the ground, is standing 32.0m from a tree. The ground is level and the tree is growing straight up. The observer's line of sight of the treetop makes an angle of 20.0$^\circ$ with the horizontal. How tall is the tree?

4. A circle has radius 0.20 m.
   a) What is the area?, $A = \text{ ___}$
   b) What is the circumference?, $s = \text{ ___}$

6. Solve for the unknown terms, determine the numerical values.
   a) $r^2 = x^2 + y^2; \quad r = 5.4, x = 3.2, \quad y = \text{ ___}$
   b) $x = x_0 + v_0 t + \frac{1}{2} g t^2; \quad x = 0.0, x_0 = 20.0, v_0 = 6.5, g = -9.81, t = \text{ ___}$
   c) $x = \frac{1}{2} a t^2; \quad x = v_0 t; \quad a = 4.5, \quad v_0 = 6.5, \quad t = \text{ ___}$
   d) $y = 2^{3/2} 64^{2/3}; \quad y = \text{ ___}$
   e) $3x + 4y = 5; x + y = 7; \quad x = \text{ ___}, \quad y = \text{ ___}$
7. Which of the following is the graph of \( y = \cos(x) \) for \( 0 < x < \pi \)?

- a)
- b)
- c)
- d)

answer: ____________

8. 

\[(x + y)^2 + (x - 3y)^2 = \]

a) \(2x^2 + 8xy + 16y^2\)  

b) \(2x^2 + 10y^2\)  

c) \(2x^2 + 7y^2\)  

d) \(2x^2 - 8y^2\)  

e) \(2x^2 - 4xy + 10y^2\)

answer: ____________

9. 

\[\frac{8x}{3x-6} \cdot \frac{x^2 - 4}{2x+4} = \]

a) \(-\frac{4}{3}(x-1)\)  

b) \(\frac{4x(x-2)}{3(x+2)}\)  

\(\frac{4x^3 - 16x}{6x^2 - 12}\)

d) \(\frac{4}{3}x\)  

e) \(\frac{x^2 + 8x - 4}{5x-2}\)

answer: ____________
If the figure above is the graph of \( y = f'(x) \), which of the following could be the graph of \( y = f(x) \)?

(A) \hspace{2cm} (D)

(B) \hspace{2cm} (E)

(C)

answer:__________________
If \( b > 0 \) and if \( \int_0^b x \, dx = \int_0^b x^2 \, dx \), then the area of the shaded region in the figure above is

(A) \( \frac{1}{12} \)
(B) \( \frac{1}{6} \)
(C) \( \frac{1}{4} \)
(D) \( \frac{1}{3} \)
(E) \( \frac{1}{2} \)

answer: ______________