Diagnostic Exam, Physics 98, Fall 2020

October 1, 2020

Please answer the following 15 questions to the best of your ability. Show the work that got you to an answer. If you don't know how to do a problem, explain to the best of your ability why/where you got stuck.

- 1. Suppose $f(x) = x^2$. Draw a graph of f(x-2) vs. x [where x is on the horizontal axis].
- 2. The following graph shows y vs. x [y is on the vertical axis, and x is on the horizontal]. Give the equation for y(x).



- 3. The equation $x^2 + 6x + 9 + y^2 = 1$ describes what? Be as descriptive as you can.
- 4. The following graph shows y vs. x [y is on the vertical axis, and x is on the horizontal]. Give the equation for y(x).



5. If $y(t) = (-1/2)gt^2$ and t(x) = x/v, what is y(t(x))?

- 6. If a = 3 and b = -2, evaluate $\frac{a^2 2b}{\sqrt{a^3 + b}}$.
- 7. In the system of equations

$$x + 3y = 7$$
$$5x - 2y = 1$$

,

what is the value of x?

- 8. Assuming x is not equal to ± 2 , simplify the expression $\frac{\left(\frac{x-2}{3}\right)}{\left(\frac{x^2-4}{6}\right)}$.
- 9. Simplify the following, where z is a real number: $\sqrt{(z^2)^3}$.
- 10. Solve the equation $t^2 9t + 10 = 0$ for t.
- 11. In a 45°-45°-90° triangle, one side length is $\sqrt{2}$ and the other side length is 1. What is the length of the third side?
- 12. If angle a in the following figure is 30° , then what is angle b, as expressed in radians?



13. What is angle DBM in the following figure?



14. What is the length y of the following ramp? You can leave your answer in terms of an appropriate trigonometric function (i.e., don't use a calculator).



15. If $\tan \theta = 5/x$ ($0 < \theta < 90^{\circ}$), then what is $\sin \theta$ in terms of x?