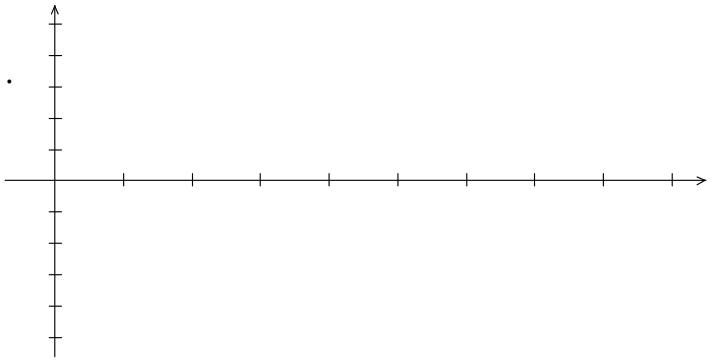
Math 1220 Test 1 Name_____

You must show all work. On problems involving an integral, you must write the integral as well as show the work for computing the integral. Solutions that are not justified with appropriate work will not receive full credit. Partial credit will be awarded for correct work.

1. Consider an object moving along a line with the velocity function $V\ t\ = 4\cos\ \pi t$ with $0 \le t \le 4$.

a) (4 pts) Graph the function on the interval $0,4$.
Label a tick mark on each axis with the scale.

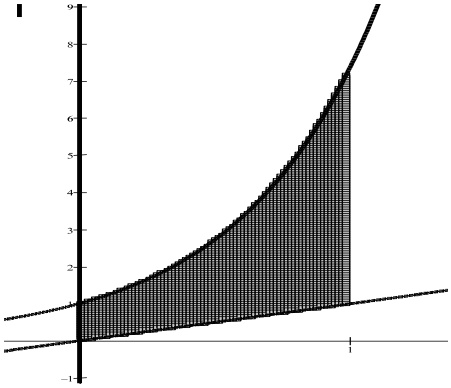


b) (4 pts) State the intervals when the object is moving in the positive direction.

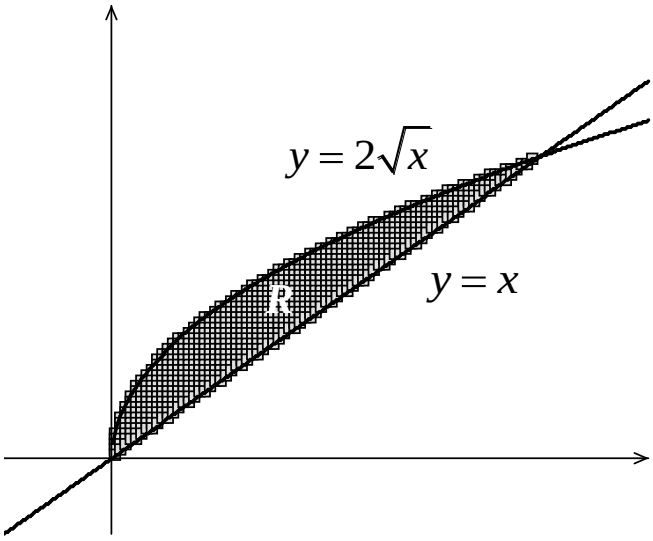
c) (4 pts) Find the displacement over the interval [0, 2]. (You must show your work or give an explanation to get credit). Interpret what your answer means.

d) (4 pts) Find the distance traveled over the interval [0, 2].

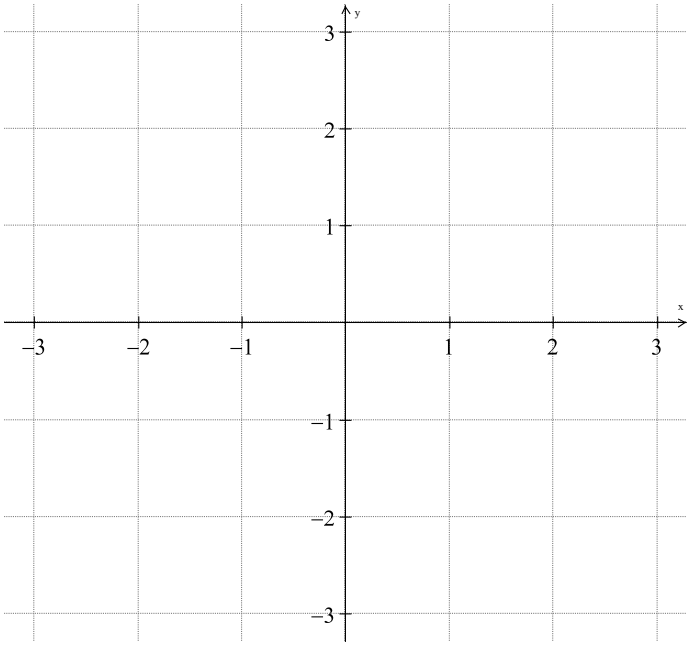
2. (10 pts) Find the area of the region bounded by $y = e^{2x}$, $y = x$, $x = 0$ and $x = 1$ shown below. Leave answer in exact form.



3. (10 pts) Let *R* be the region shown below bounded by the curves, $y = x$ and $y = 2\sqrt{x}$. Use the washer method to find the volume of the solid generated when *R* is revolved around the *x*-axis.
Leave answer in exact but simplified form.



4. Let R be the region bounded by the curves $y = x^2$, $y = 2 - x^2$ and $x = 0$.



a) (4 pts) Sketch the curves given above, clearly showing R.

b) (8 pts) Use the shell method to find the volume of the solid generated when R is revolved about the y axis.

5. (8 pts) Find the arc length of the curve $y = \frac{2}{3}(x^2 + 1)^{\frac{3}{2}}$ from $x = 0$ to $x = 1$.

6. (10 pts) Find the mass of a thin bar that is 8 meters in length with density on the interval [0, 8] given by the function $\rho\ x\ = x\sqrt{64 - x^2}$ kg/m^3.

BONUS: (3 pts) A conical tank (inverted cone) has a height of 12 meters and a radius at the top of 4 meters. On top of that is a cynlindrical piece of the tank that is 2 meters high. (see picture). The conical part of the tank has olive oil to a level of 6 meters when the bottom spout jams and making it necessary to pump the olive oil to an outlet at the top of the tank. Olive oil has a density of 913 kg/m^3 . How much work is done to pump all of the olive oil to the level of the top of the tank?