Name _____ Test 3, Spring 2018

1) Find ONE of the integrals below. (6 points)

$$\int 2x(x^2-1)^{99}dx$$

$$\int_0^1 2x(4-x^2)dx$$

2) Find the integral below. (6 points)

$$\int \frac{2x^2}{\sqrt{1-4x^3}}dx$$

3) Find the integral below. (6 points)

$$\int \frac{x}{\sqrt{x-4}}\,dx$$

4) Find ONE of the integrals below. (6 points)

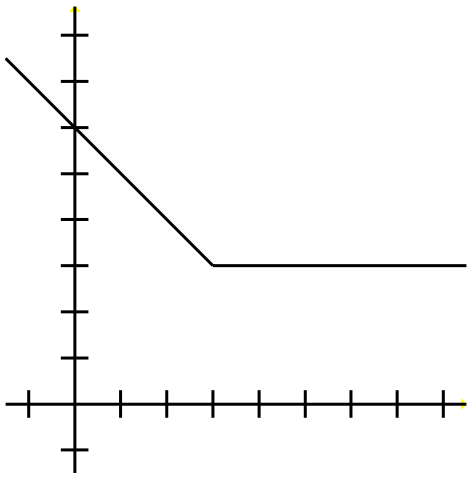
$$\int_0^{\ln(4)} \frac{e^x}{3+2e^x}\,dx$$

$$\int_0^{\frac{\pi}{2}} \sin^2(\theta)\cos(\theta)\,d\theta$$

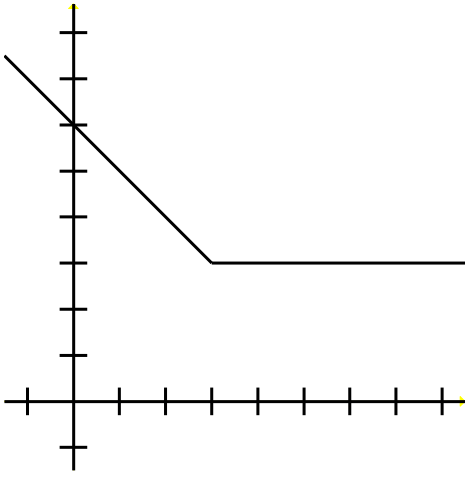
5) Consider the function $f(x) = x^2$ on the interval $[1,4]$. The mean value theorem guarantees that there is a point $x = c$ such that $f'(c) = m$. In this context, what is m?
(4 points)

6) Consider the function f with derivative $f'(x) = 3x^2 + 3$ and initial value $f(1) = 8$. Find $f(x)$.
(6 points)

7) Use geometry to find the **actual** area between $f(x)$ and the x-axis between $x = 0$ and $x = 6$.
(6 points)

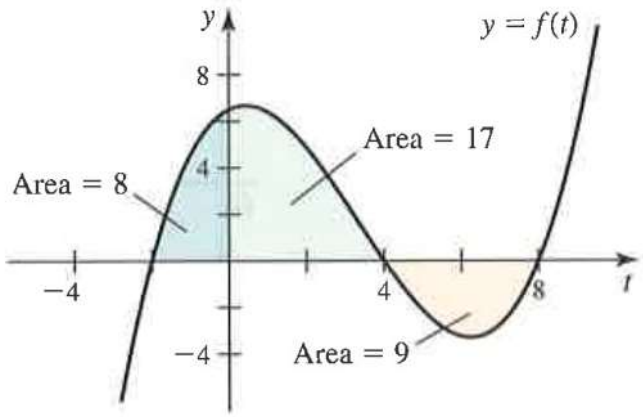


8) Use a **right** Riemann Sum with 3 rectangles to **estimate** the area between $f(x)$ and the x-axis between $x = 0$ and $x = 6$. (Illustrate your rectangles and find the area)
(6 points)



9) Below is a graph of a function with some associated areas. Use the graph to find the integral below. (6 points)

$$\int_0^8 f(x)dx$$



10) A velocity function is given below. Find the displacement over the interval $0 \leq t \leq 8$

$$v(t) = t^2 - 6t + 8$$

(Set up, but do not integrate.)
(6 points)

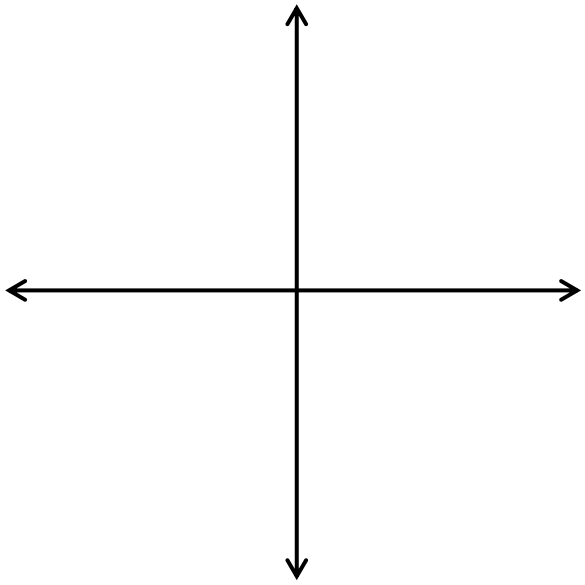
11) A velocity function is given below. Find the distance travelled over the interval $0 \leq t \leq 8$

$$v(t) = t^2 - 6t + 8$$

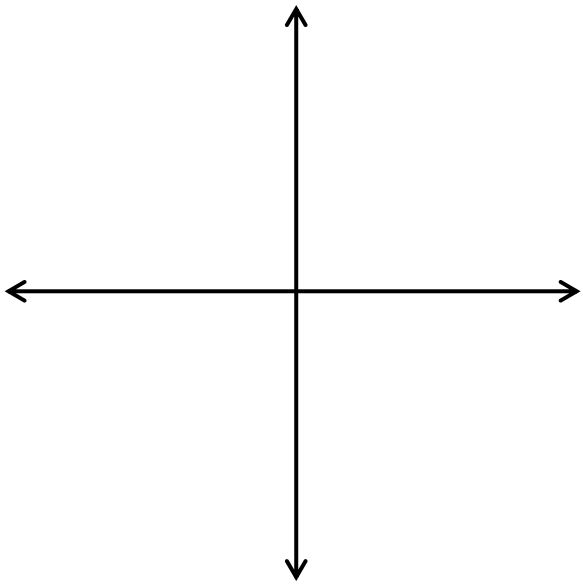
(Set up, but do not integrate.)
(6 points)

On problems 12-17 illustrate the problem using a Cartesian Plane, then find the solution.

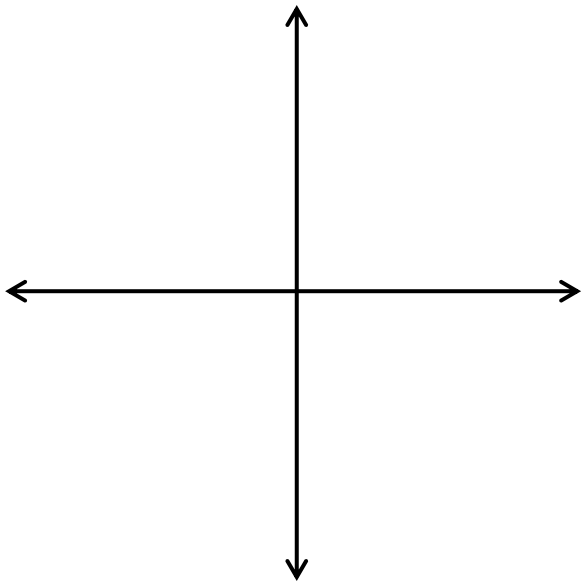
12) Find the area of the region bounded by $y = 2 - |x|$ and $y = x^2$.
(Set up, but do not integrate.)
(6 points)



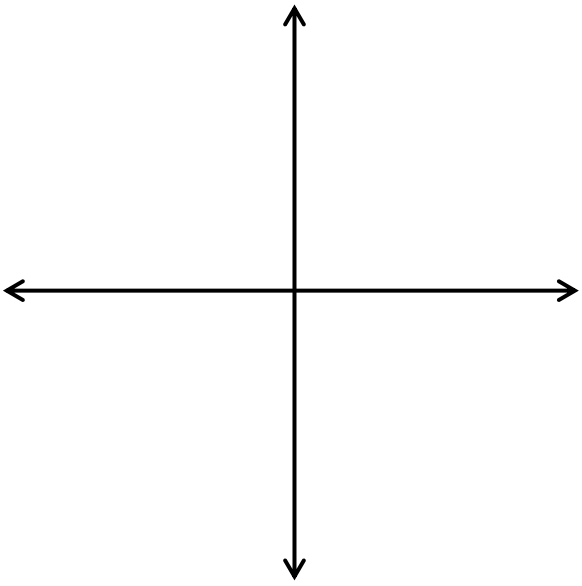
13) The region bounded by $y = \sqrt{25 - x^2}$ and $y = 0$ is rotated around the x-axis. Find the volume of the resulting 3-D solid. (Set up, but do not integrate. Circle which method you're using)
(Disk/washer) (Cylindrical Shell)
(6 points)



14) The region bounded by $y = x$ and $y = \sqrt{x}$ is rotated around the x-axis. Find the volume of the resulting 3-D solid. (Set up, but do not integrate. Circle which method you're using)
(Disk/washer) (Cylindrical Shell)
(6 points)



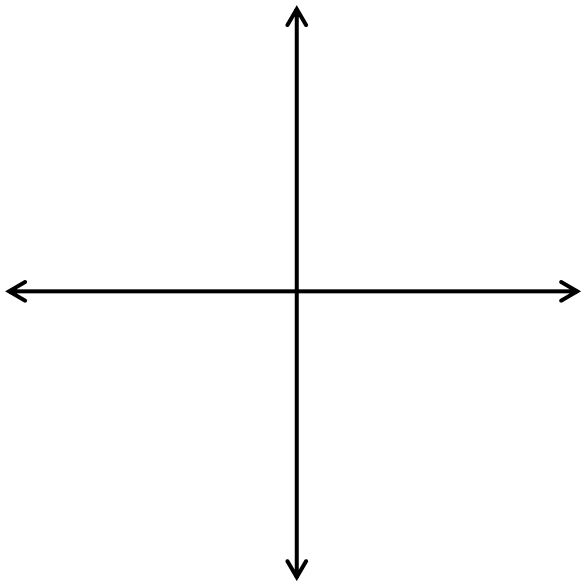
15) The region bounded by $y = x^3 - x^8 + 1$ and $y = 1$ is rotated around the x-axis. Find the volume of the resulting 3-D solid. (Set up, but do not integrate. Circle which method you're using)
(Disk/washer) (Cylindrical Shell)



16) Find the length of the curve $y = x^3 + 2$ between $x = -2$ and $x = 1$.

(Set up, but do not integrate.)

(6 points)



17) Find the area of the surface generated when the curve $y = 8\sqrt{x}$ between $x = 9$ and $x = 20$ is rotated around the x-axis.

(Set up, but do not integrate.)

(6 points)