NAME:_____ **DATE: 02/05/2018**

ASSIGNMENT: Definite Integrals
DIRECTIONS: In lieu of calculating Riemann sums and introducing under or overestimation, we can accomplish the same task with the anti-derivative (integral). The process of finding the anti-derivative means going backwards: increasing the exponent by 1 and dividing the function by that same exponent.

For example: $f(x) = 2x^3 - 4x^2 + 3$; $\int f(x)\,dx = \frac{2x^4}{4} - \frac{4x^3}{3} + 3x + C$

Then we can simplify: $\int f(x)\,dx = \frac{x^4}{2} - \frac{4x^3}{3} + 3x + C$

If we are trying to calculate the area under this curve, we need to know our starting and ending points. If we want to start at x = 1 and calculate the area from there to x = 3, then we would evaluate the integral from 1 to 3. We do this by subtracting the two outputs.

$$\int_1^3 f(x)\,dx = \int f(3)\,dx - \int f(1)\,dx = \frac{(3)^4}{2} - \frac{4(3)^3}{3} + 3(3) - \left[\frac{(1)^4}{2} - \frac{4(1)^3}{3} + 3(1)\right] = \frac{34}{3}$$

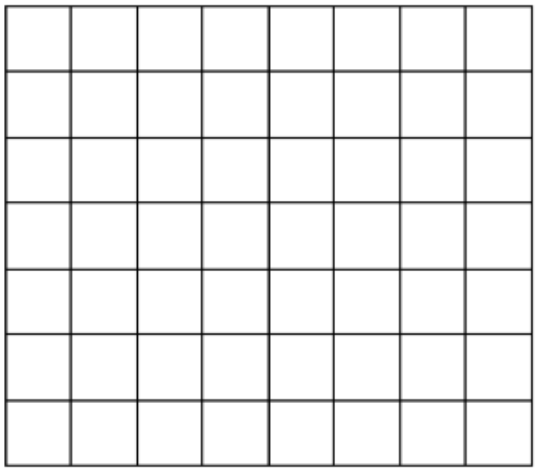
34/3 is the exact area under this function evaluated along the domain [1, 3].

1.) Consider the region bounded by the graphs of: *[non-calculator]*

$y = x^3$, $x = 0$, $y = 0$, $x = 2$

(a) On the accompanying sketch of the graphs, shade the region.

(b) Find the area of the shaded region. **(find approximate area first, then exact)**



_____

_____

_____

_____

_____

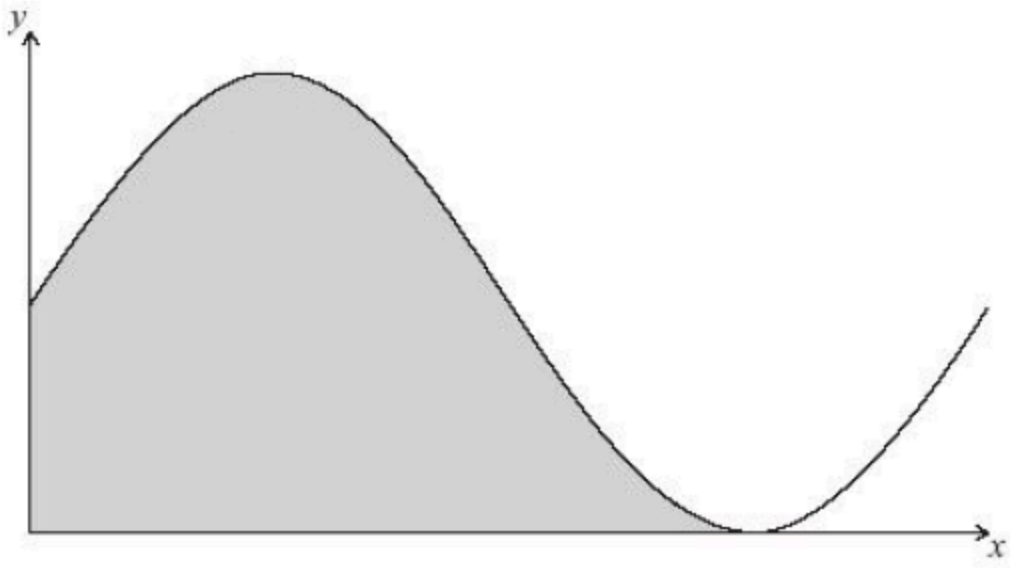
_____

_____

NAME:_____ **DATE: 02/05/2018**

2.) ***OPTIONAL* Find the shaded region.** *[non-calculator; +10 extra credit]*

Let $f(x) = 6 + 6\sin x$. Part of the graph of f is shown below.



The shaded region is enclosed by the curve of f, the x-axis, and the y-axis.

NAME:_____ **DATE: 02/05/2018**

Answer key (please show all calculations for work not done in class).

1.) 4
2.) 9π + 6; optional: you will not be penalized if you decide to not complete this problem