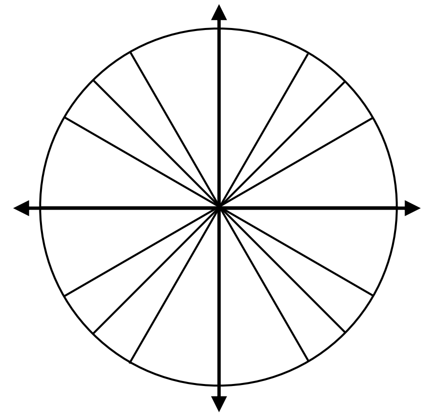
Integration and Trig Functions

1.

a) Without using your graphing calculator, book, notes, or any assignments, carefully sketch and label the trig function $f(x)=\cos x$, $[0,\pi]$, where $x=\theta$ radians.
(Remember: In the Unit Circle, $\cos\theta$ is the x-coordinate.)



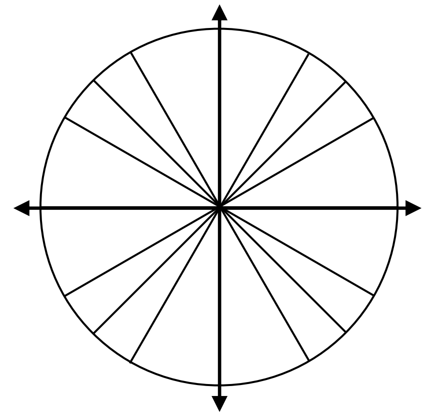
b) Use partitions $P=\left\{0,\frac{\pi}{4},\frac{\pi}{2},\frac{3\pi}{4},\pi\right\}$ and the **midpoint Riemann Sum** to approximate the **Area** between the graph of the function and the x-axis. Sketch the rectangles on the graph of $f(x)=\cos x$, $[0,\pi]$.
(Use a calculator to find the cosine values and to find the sum. Answer to the nearest hundredth.)

c) Next, find the **Area** by integration: $\int_0^{\pi}(\cos x)dx$

d) Now, do the integration by breaking it up into 2 parts: $\int_0^{\frac{\pi}{2}}(\cos x)dx+\int_{\frac{\pi}{2}}^{\pi}(\cos x)dx$

What do you notice when it's broken up?

e) With the constant ***C*** equal to **0**, sketch and label the graph of ***F(x)***, the anti-derivative of $f(x)=\cos x$, $[0,\pi]$ where $x=\theta$ radians. ***F(x)*** = ________________



f) Using ***F(x)***, find the ***average slope m_{av}*** between the points at $x=0$ and $x=\frac{\pi}{2}$. (Answer as complex fraction.)

How much did the value of $F(x)$ increase or decrease in the interval from 0 radians to $\frac{\pi}{2}$ radians?

Using ***F(x)***, find the ***average slope*** $\boldsymbol{m_{av}}$ between the points at $x=\frac{\pi}{2}$ and $x=\pi$. (Answer as complex fraction.)

How much did the value of $F(x)$ increase or decrease in the interval from $\frac{\pi}{2}$ radians to π radians?

g) Using ***f(x)***, find the average function-value, f_{av}, of $f(x)=\cos x$, $\left[0,\frac{\pi}{2}\right]$. (Exact answer **&** to nearest hundredth.)

Then, find the product of this $\boldsymbol{f_{av}}$ and $\frac{\pi}{2}$.

Using ***f(x)***, find the average function-value, f_{av}, of $f(x)=\cos x$, $\left[\frac{\pi}{2},\pi\right]$. (Exact answer **&** to nearest hundredth.)

Then, find the product of this $\boldsymbol{f_{av}}$ and $\frac{\pi}{2}$.