Problem 1. Use right/left Riemann sum for this integral to approximate the following integrals.

1. $\int_{-2}^{1} \big(x^2+2\big)dx$ $n=6$
2. $\int_{0}^{1} \big(2x^3+2x^2+2\big)dx$ $n=4$
3. $\int_{-1}^{0} \sqrt{x+1}dx$ $n=4$
4. $\int_{-2}^{1} \big(x^3-x\big)dx$ $n=3$

Problem 2. Express the following integrals in terms of a limit of Riemann Sum. Do not evaluate the limit.

1. $f(x)=\frac{2x}{x^2+1}$ $1\le x\le 3$
2. $f(x)=\sqrt{\sin(x)}$ $0\le x\le \pi$

Problem 3. Express the following limits in terms of definite integrals.

a. $\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}\frac{2}{n}\big(5+\frac{2i}{n}\big)^{10}$

b. $\lim\limits_{n\to\infty}\sum\limits_{i=1}^{n}\frac{\pi}{4n}\tan\big(\frac{i\pi}{4n}\big)$

Problem 4. (Optional)
Use the midpoint rule with the given value of n to approximate the following integrals.

1. $\int_{0}^{8} \sin\sqrt{x}dx$ $n=4$
2. $\int_{0}^{\frac{\pi}{2}} \cos^4 x dx$ $n=4$
3. $\int_{1}^{5} x^2e^{-x}dx$ $n=4$