Question 1 (1 pts)

Express the limit, $lim_{n\to\infty}\sum_{i=1}^{n}\frac{2}{n}(1+\frac{2i}{n})\sqrt{1+\frac{2i}{n}}$, as a definite integral.

A. $\int_1^3 x\sqrt{x}\,dx$

B. $\int_1^3 \sqrt{x}\,dx$

C. $\int_1^3 (x\sqrt{x})\frac{2}{n}\,dx$

D. $\int_1^n x\sqrt{x}\,dx$

Question 2 (1 pts)

Suppose $\int_1^2 x^2\,dx$. Using this information, what are absolute minimum and maximum of the integrand $f(x)=x^2$? (Write as an inequality).

A. $1\leq x\leq 2$

B. $1\leq x^2\leq 4$

C. $1\leq x^2\leq 2$

D. $1\leq x\leq 4$

Question 3 (1 pts)

Suppose you want to estimate $\int_1^4 f(x)\,dx$, with 3 rectangles. What are the midpoints of the subintervals?

A. $x_1=2, x_2=3, x_3=4$

B. $x_1=\frac{1}{2}, x_2=\frac{3}{2}, x_3=\frac{5}{2}$

C. $x_1=\frac{3}{2}, x_2=\frac{5}{2}, x_3=\frac{7}{2}$

D. $x_1=1, x_2=2, x_3=3$

Question 4 (1 pts)

Which of the following defines a definite integral?

A. An antiderivative that produces a function with an arbitrary constant C.

B. The limit as $f(x)$ goes to infinity.

C. The derivative of the area function.

D. An integral which is evaluated over a specific interval, and produces a constant value.

Question 5 (1 pts)

The fundamental theorem of calculus (part 1) says: If f is continuous on $[a,b]$, then the function g defined by $g(x)=\int_a^x f(t)\,dt$, $a\leq x\leq b$, is continuous on $[a,b]$ and differentiable on (a,b), and $g'(x)=f(x)$. What does this mean in words?

A. $g'(x)$ exists on $[a,x]$.

B. The derivative of the area function is equal to the integrand.

C. The derivative of $f(x)$ is equal to $F(b)-F(a)$.

D. $g(x)$ is only differentiable when $f(t)$ exists on $[a,b]$.

Question 6 (1 pts)

The fundamental theorem of calculus (part 2) says: If $f(x)$ is continuous on $[a,b]$, then $\int_a^b f(x)\,dx = F(b) - F(a)$, where $F(x)$ is any antiderivative of $f(x)$. What does this mean in words?

A. If $F(x)$ is the anti-derivative of $f(x)$, then $\int_a^b f(x)\,dx$ is equal to $F(x)$ evaluated at b, subtracted by $F(x)$ evaluated at a.

B. The derivative of $f(x)$ is equal to $F(b) - F(a)$.

C. The derivative of the area function is equal to the integrand.

D. The derivative of $f(x)$ is equal to $F(x)$ evaluated at b, subtracted by the $F(x)$ evaluated at a.

Question 7 (1 pts)

Suppose you have $\int_{-1}^2 x^2\,dx$ and $F(x) + C$ is the antiderivative of $f(x)$, where $C = 0$. Using the same notation as the Fundamental Theorem of Calculus, what is $F(b)$ and $F(a)$?

A. $F(b) = F(-1) = \frac{-1}{3}$
$F(a) = F(2) = \frac{8}{3}$

B. $F(b) = F(2) = \frac{4}{3}$
$F(a) = F(-1) = \frac{-1}{3}$

C. $F(b) = F(2) = \frac{8}{3}$
$F(a) = F(-1) = \frac{-1}{3}$

D. $F(b) = F(2) = \frac{8}{3}$
$F(a) = F(-1) = \frac{1}{3}$

Question 8 (1 pts)

Which of the below is equivalent to $\int_1^2 x^3 + 2x + 3\,dx$?

A. $\frac{39}{4}$

B. $\frac{x^4}{4} + x^2 + 3x\Big|_1^2$

C. $(\frac{2^4}{4} + 2^2 + 3(2)) - (\frac{1}{4} + 1 + 3)$

D. A, B, and C.

Question 9 (1 pts)

Evaluate $\int_2^2 \sqrt{x}\,dx$.

A. 0

B. $\frac{2^{5/2}}{3}$

C. Does not exist.

D. $\frac{2^{5/2}-2}{3}$

Question 10 (1 pts)

Evaluate $\int_{-1}^2 \frac{1}{x^3}\,dx$.

A. $\frac{3}{8}$

B. Does not exist

C. 0

D. $\frac{-3}{8}$