1. Suppose we want to calculate $\int x^3 \cos(x^4)\,dx$ using substitution. What substitution should we use?

(A) $u = \cos(x)$

(B) $u = \cos(x^4)$

(C) $u = x^4$

(D) None of the above

2.   True or False?

$$\int_0^1 x(x+1)^9 \, dx = \int_1^2 (u^{10} - u^9) \, du.$$

3. True or False?

Let f be a differentiable function and

$$A(x) = \int_0^x f(t)\, dt.$$

If f is increasing, then A is concave up.

3. True or False?

Let f be a differentiable function and

$$A(x) = \int_0^x f(t)\, dt.$$

If f is increasing, then A is concave up.

Follow-up. What can you say if f is decreasing?

4. Suppose we want to calculate $\int \dfrac{\ln(x)}{x}\,dx$ using substitution. What substitution should we use?

(A) $u = \ln(x)$

(B) $u = x\ln(x)$

(C) $u = 1/x$

(D) None of the above

5. True or False?

$$\int_1^e \frac{\ln x}{x}\, dx = \int_1^e u\, du.$$

6. What is $\int_{-1}^{1} |2x^3| \, dx$?

(A) 0

(B) 1

(C) 2

(D) None of the above

7. Suppose we want to calculate $\displaystyle\int \frac{dx}{x \ln x}$ using substitution. What substitution should we use?

(A) $u = \ln(x)$

(B) $u = x \ln(x)$

(C) $u = 1/x$

(D) None of the above

8. Suppose F is a function such that $F(1) = 3$ and $F'(x) = x^2$. Then $F(4) = ...$?

(A) 20

(B) 22

(C) 24

(D) None of the above

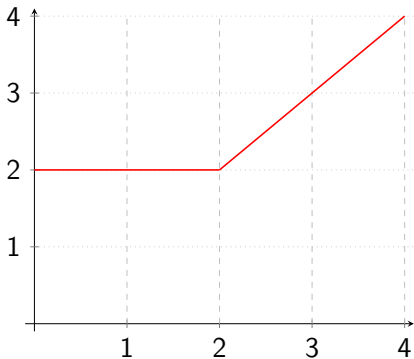9.   True or False?

For any positive integer n, we have
$$\int_0^{\pi/2} (\sin x)^n \cos x \, dx = \frac{1}{n+1}.$$

10.   True or False?

The function $f(x) = |x|$ has an antiderivative.

The graph of a function f is depicted to the right, and

$$A(x) = \int_0^x f(t)\, dt.$$

11.   Find a formula describing $A(x)$ in terms of x without any integrals.