

14. If $y = f(x)$ is a solution to the differential equation $\frac{dy}{dx} = e^{x^2}$ with the initial condition $f(0) = 2$, which of the following is true?

(A) $f(x) = 1 + e^{x^2}$

(B) $f(x) = 2xe^{x^2}$

(C) $f(x) = \int_1^x e^{t^2} dt$

(D) $f(x) = 2 + \int_0^x e^{t^2} dt$

(E) $f(x) = 2 + \int_2^x e^{t^2} dt$

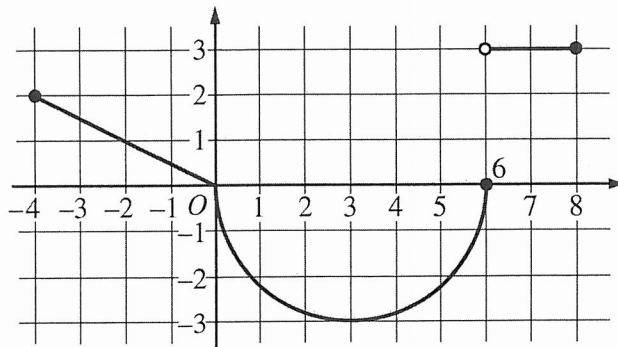
19. $\lim_{x \rightarrow 0} \frac{4x^2}{e^{4x} - 4x - 1}$ is

- (A) 0 (B) $\frac{1}{2}$ (C) 8 (D) nonexistent

25. Which of the following is a solution to the differential equation $y'' - 4y = 0$?

- (A) $y = e^{2x}$ (B) $y = 2e^x$ (C) $y = \sin(2x)$ (D) $y = \cos(2x)$

NO CALCULATOR ALLOWED

Graph of g

3. The function g is defined on the closed interval $[-4, 8]$. The graph of g consists of two linear pieces and a semicircle, as shown in the figure above. Let f be the function defined by $f(x) = 3x + \int_0^x g(t) dt$.

(a) Find $f(7)$ and $f'(7)$.

(b) Find the value of x in the closed interval $[-4, 3]$ at which f attains its maximum value. Justify your answer.

Do not write beyond this border.

Do not write beyond this border.

3

3

3

3

3

3

3

3

3

3

NO CALCULATOR ALLOWED

(c) For each of $\lim_{x \rightarrow 0^-} g'(x)$ and $\lim_{x \rightarrow 0^+} g'(x)$, find the value or state that it does not exist.

(d) Find $\lim_{x \rightarrow -2} \frac{f(x) + 7}{e^{3x+6} - 1}$.

Do not write beyond this border.

Do not write beyond this border.