

Click here for an answer key.

This test has pages 1 – 6. Take a moment to make sure you have them all.

No Calculators Allowed; No Reference Materials; Just You and Your Pencil and Eraser. Show your steps.

- 1 Show steps in writing an equation for the line tangent to the graph of $f(x) = xe^{-x^2/2}$ at the graph's y -intercept.

- 2 Show steps in evaluating $\int_0^2 xe^{-x^2/2} dx$

3 Show steps in making a stickman graph of $f(x) = xe^{-x^2/2}$ for $-10 \leq x \leq 10$. Label critical points with their coordinates.

4 Show steps in finding the intervals on which the graph of $f(x) = xe^{-x^2/2}$ is concave upward.

- 5 An alligator farmer has a budget of **\$5,400** to spend on fencing for a rectangular enclosure next to a straight river, which forms one of the enclosure's sides. The enclosure is open on the river side so that the rare homing alligators can access the river at will.

The situation is complicated by the fact that he must use fencing costing **\$4** per yard along the side opposite the river side, but he can use fencing costing only **\$3** per running yard on the other two sides.

Show steps in determining the dimensions of the largest-area enclosure he can build on his fencing budget.

6 Show steps in evaluating $\lim_{x \rightarrow 0} \frac{xe^x}{e^{2x} - 1}$

7 Find the formula for $f(x)$ if

$$f'(x) = 6e^{3x} - 4\sin(2x) + 3 \quad \text{and} \quad f(0) = 19$$

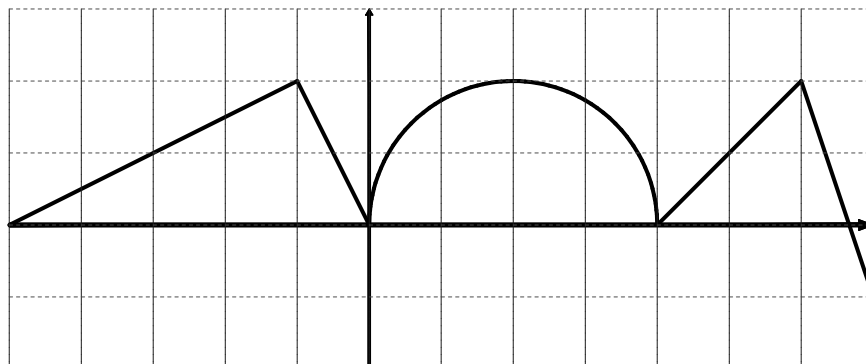
8 Show steps in in evaluating these integrals:

(a) $\int_0^1 x(\sqrt[3]{x} + \sqrt[4]{x}) dx$

(b) $\int \frac{e^x}{\sqrt{3 + e^x}} dx$

(c) $\int_{e^2}^{e^4} \frac{\ln(x)}{x} dx$

9 On this graph of function f , the coordinate squares are one unit on a side:



Give numerical values for the following:

- (a) $f(2)$ _____
- (b) $f'(2)$ _____
- (c) $f'(5)$ _____
- (d) $f'(0)$ _____
- (e) $f'(-2)$ _____
- (f) $\int_{-5}^{-1} f(x) dx$ _____
- (g) $\int_6^4 f(x) dx$ _____
- (h) $\int_{-2}^{-1} f'(x) dx$ _____
- (i) $\int_4^6 f''(x) dx$ _____
- (j) $\int_0^2 x f(x^2) dx$ _____