

8. [6 points] Suppose

$$F(x) = \int_3^{2x} (e^{5t^2} - 2) dt.$$

Find all  $x$ -values where the graph of  $y = F(x)$  has a horizontal tangent line, showing all of your work. You do not need to simplify your answer(s).

9. [9 points] For each part of this problem, write the CAPITAL LETTER corresponding to **ALL** answers that apply on your submission. You do not need to show your work.

- a. [5 points] Suppose  $f(x)$  is a continuous function defined for  $x \geq 1$  satisfying:

- $f(x) > 0$  for all  $x \geq 1$ .
- $f(x)$  is decreasing on its domain.
- $f(x) \leq \frac{1}{\sqrt{x}}$

**Which of the following MUST be true about  $f(x)$ ?**

- (A)  $\int_1^{\infty} f(x) dx$  converges.
- (B)  $\int_1^{\infty} (f(x))^2 dx$  converges.
- (C)  $\int_1^{\infty} \frac{f(x)}{x} dx$  converges.
- (D)  $\int_1^{\infty} f(x) dx$  diverges.
- (E) None of the above.

- b. [4 points] Which of the following pairs of polar coordinates are the same point in the  $xy$ -plane as the point  $(x, y) = (-1, 1)$ ?

- (A)  $(r, \theta) = \left(\frac{\sqrt{2}}{2}, \frac{\pi}{4}\right)$
- (B)  $(r, \theta) = \left(1, \frac{3\pi}{4}\right)$
- (C)  $(r, \theta) = \left(-\sqrt{2}, -\frac{\pi}{4}\right)$
- (D)  $(r, \theta) = \left(-\frac{\sqrt{2}}{2}, \frac{5\pi}{4}\right)$
- (E) None of the above.