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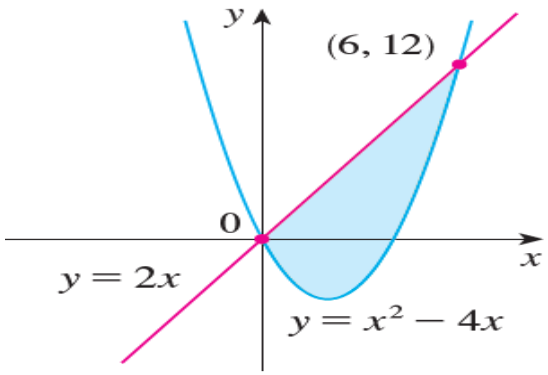
Time: 90 minutes Marks: 30

(Answer all the questions)

1. If $f(x,y) = y^4e^{-4x} - x^3\cos y$, then find the following partial derivatives:
   (a) f_{xx} [3]
   (b) f_{yy} [3]
2. Let $f(x) = \frac{x^4}{4} + \frac{x^3}{2} - 3\frac{x^2}{4} - x - 1$
   (a) Find the relative maxima and relative minima. [3]
   (b) Find the absolute maxima and absolute minima. [3]
3. Evaluate the following definite integrals:
   (a) $\int_3^4 (2x^4 + 4x^3 - 5x^2 - 10x)dx$ [3]
   (b) $\int_0^{\pi/4} \frac{Secx+Cosx}{4Cosx}dx$ [3]
4. Evaluate the following indefinite integrals:
   (a) $\int e^x Cosx dx$ [3]
   (b) $\int \frac{5x}{x^2+1}dx$ [3]
5. Find the area of the shaded region by integration. [3]



6. Find two x-intercepts of the function $f(x) = \frac{x}{3} - \sqrt{x}$ and find the value of c, so that $f'(c) = 0$ at some point c between those intercepts. [3]