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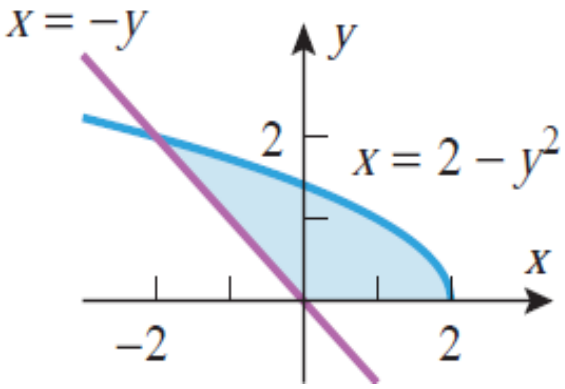
Time: 90 minutes Marks: 30

(Answer all the questions)

1. Find two x-intercepts of the function $f(x) = \frac{x}{2} - \sqrt{x}$ and find the value of c, so that $f'(c) = 0$ at some point c between those intercepts. [3]

2. Find the area of the shaded region by integration. [3]



3. Evaluate the following indefinite integrals:

   (a) $\int e^x Sinx dx$ [3]

   (b) $\int \frac{4x}{x^2+1} dx$ [3]

4. Let $f(x) = \frac{x^4}{4} - 2\frac{x^3}{3} - 5\frac{x^2}{2} + 6x + 5$

   (a) Find the relative maxima and relative minima. [3]

   (b) Find the absolute maxima and absolute minima. [3]

5. Evaluate the following definite integrals:

   (a) $\int_2^4 (5x^4 + 6x^3 - 2x^2 - 8x) dx$ [3]

   (b) $\int_0^{\pi/4} \frac{Cosx + Secx}{3Cosx} dx$ [3]

6. If $f(x, y) = y^2 e^{-3x} - x^3 \sin y$, then find the following partial derivatives:

   (a) f_{xx} [3]

   (b) f_{yy} [3]