MATH 3A - PRACTICE SECOND MIDTERM EXAM

Spring 2009, Version A
Perm #: ____________________________

Discussion time: ________________ NAME: ____________________________

No Calculators. Solve each problem in the blue book. Number your solutions according to the corresponding problems. No points will be given for answers with no explanation. In the end staple this page to the inside front cover of the blue book, so that this side faces the white pages.

SCORE /30

1. If the function is given implicitly by \(x^3 + y^3 = 1\), find \(y''\) by implicit differentiation. /6

2. If a ball is given a push so that it has an initial velocity of 5 m/s down a certain inclined plain, then the distance it has rolled after \(t\) seconds is \(s = 5t + 4t^2\).
   a) Find the velocity of the ball after 2 seconds. /6
   b) How long does it take for the velocity to reach 45 m/s?

3. A spotlight on the ground shines on a wall 15 m away. If a man 2 m tall walks from the spotlight toward the building at a speed of 1.2 m/s, how fast is the length of his shadow on the building decreasing when he is 5 m from the building? /6

4. Differentiate the functions.
   a) \(\cos^{-1}(\sin x)\) /6
   b) \(\frac{3^x}{x^3} - x + 3\)
   c) \((x^3 + 2x) \ln x\)

5. Use differentials to estimate the amount of paint needed to apply a coat of paint 0.05 cm thick to a hemispherical dome with diameter 50 m. /6