Math 3350 | Competency Exam | 26 January 2010Ver
Version D-M

Part I. Calculus I competency.

1. (5 pts) Find the equation of the tangent line to the graph of the function $f(x) = \sqrt{7-3x}$ at x = 1.

2. (5 pts) Find the derivative of $a(x) = x^{-2/3} + \dfrac{4}{3x}$

3. (5 pts) Find the derivative of $b(x) = \dfrac{3x-2}{7-5x}$

4. (5 pts) Find the derivative of $c(x) = e^{-5x}\cos 9x$

5. (5 pts) Find the derivative of $e(x) = x^3 \ln x - 3x^2$

6. (5 pts) Find the derivative of $f(x) = (2x^2 - x + 3)^4$

7. (5 pts) Find the indefinite integral $\int (4x^7 - \sqrt[4]{x^5})dx$

8. (5 pts) Find the definite integral of $\int_0^{\pi/2} (2x - \cos x)dx$

9. (5 pts) Find the indefinite integral $\int (7-8x)^9 dx$

10. (5 pts) Find the indefinite integral $\int \dfrac{\sin\left(\sqrt{x}\right)-1}{\sqrt{x}}\, dx$

Part II. Calculus II Competency.

11. (5 pts) Find the area the bounded in the first quadrant bounded between the graphs of $y = x^2 + 2x$ and $y = 6x$.

12. (5 pts) Find the indefinite integral $\int xe^{2x}\, dx$

13. (5 pts) Find the partial fraction decomposition for the function $f(x) = \dfrac{3x-2}{x^2+4x}$

14. (5 pts) Find the indefinite integral $\int \dfrac{x-2}{(4x-x^2)^5} dx$

15. (5 pts) Test the series for convergence: $\sum_{k=1}^{\infty} \dfrac{\sqrt{k}}{2k^2+1}$

16. (5 pts) Test the series for convergence: $\sum_{k=1}^{\infty} \sqrt{k}\left(\dfrac{6}{5}\right)^{k-1}$

17. (5 pts) Find the first four non-zero terms of the MacLaurin series of $f(x) = \sin(2x^2)$

Part III. Calculus III competency.

18. (5 pts) Find f_x, f_y for $f(x, y) = xe^{xy^2}$

19. (5 pts) Find f_{xx}, f_{yx} for $f(x, y) = xe^{xy^2}$

20. (5 pts) Find f_x, $f_{y,}$ f_z for $f(x, y, z) = \dfrac{y + \sqrt{z - x}}{z^3}$