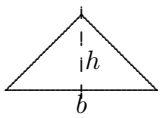
Review 3A

Math 222

1. Find the centroid of the region bounded by $y = x^2$, $x = 2$ and the x-axis.
2. Find the moment of inertia of the region in the previous problem as a thin plate of density δ about the y-axis.
3. Find the moment of inertia of a plate in the shape of an isosceles triangle that has base b units and height h units and mass M about its height.



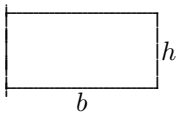
4. Use L'Hospital's Rule to evaluate $\lim\limits_{x\to 1} \dfrac{x^3 + 7x^2 - 7x - 1}{x^5 - 2x^4 + x^3 - 6x^2 + 10x - 4}$.
5. Use L'Hospital's Rule to evaluate $\lim\limits_{x\to 0} \dfrac{2\cos x - 2 + x^2}{3x^4}$.
6. Evaluate $\lim\limits_{x\to 0^+} \tan x \ln x$.
7. Evaluate $\lim\limits_{x\to 0} (\csc x - \cot x)$.
8. Evaluate $\lim\limits_{x\to 0^+} (\sin x)^{\tan x}$.
9. Determine whether or not $\displaystyle\int_1^\infty \frac{dx}{x(1+\ln x)^2}$ converges and determine its value if it does.
10. Determine whether or not $\displaystyle\int_0^1 \frac{x\,dx}{x^2 - 1}$ converges and determine its value if it does.

Answers to problems above: 1. $(\frac{3}{2}, \frac{6}{5})$ 2. $\frac{32}{5}\delta$ 3. $\frac{b^2}{24}M$ 4. -5 5. $\frac{1}{18}$ 6. 0 7. 0 8. 1 9. converges to 1 10. divergent

Review 3B

Math 222

1. Find the centroid of the region bounded by the circle $x^2 + y^2 = 4$ in the first quadrant.
2. Find the moment of inertia of the region in the previous problem as a thin plate of density δ about the y-axis.
3. Find the moment of inertia of a plate in the shape of rectangle with base b units and height h units and mass M about a vertical line on one end.



4. Use L'Hospital's Rule to evaluate $\lim_{x\to -2} \dfrac{x^3 - 6x^2 - 17x - 2}{x^4 + 2x^3 - 3x^2 - 6x}$.
5. Use L'Hospital's Rule to evaluate $\lim_{x\to 0} \dfrac{e^{x^2} - 1}{x \sin x}$.
6. Evaluate $\lim_{x\to 0^+} xe^{\frac{1}{x}}$.
7. Evaluate $\lim_{x\to 0} \left(\dfrac{1}{x} - \csc x\right)$.
8. Evaluate $\lim_{x\to 0^+} \left(1 + \dfrac{2}{x}\right)^x$.
9. Determine whether or not $\displaystyle\int_2^\infty \frac{dx}{x^2 - 1}$ converges and determine its value if it does. (Hint: partial fractions)
10. Determine whether or not $\displaystyle\int_1^3 \frac{3x^2 - 1}{\sqrt[3]{x^3 - x}} dx$ converges and determine its value if it does.

Answers to problems above: 1. $(\frac{8}{3\pi}, \frac{8}{3\pi})$ 2. $\pi\delta$ 3. $\frac{b^2}{3}M$ 4. $-\frac{9}{2}$ 5. 1 6. ∞ 7. 0 8. e^2 9. converges to $\frac{1}{2}\ln 3$ 10. converges to $6\sqrt[3]{9}$