Math 181 7/8/2021

Show all your work clearly. No Work, No Credit.
1. Test for convergence / divergence of the following improper integrals (indicate what theorem you are using)

a)
$$\int_{1}^{\infty} \frac{\sqrt{12x^{4} + 5x^{2} + 4}}{3x^{4} + 2x^{2} + 4} dx \quad (4 \text{ pts})$$
dominant hom: $\frac{x^{2}}{x^{5}} = \frac{x^{2}}{x^{5}} = \frac{1}{x^{5}} \int_{1}^{\infty} 9 \text{ conserved} \Rightarrow \text{ construct}^{n} \text{ bigger}^{n}$

$$n \int_{1}^{\infty} \frac{\sqrt{12x^{4} + 5x^{5} + 2}}{3x^{5} + 2x^{2} + 4} dx = \int_{2}^{\infty} \frac{\sqrt{12x^{4} + 5x^{4} + 2x^{4}}}{x^{5}} dx = \int_{1}^{\infty} \frac{\sqrt{14x^{4}}}{x^{5}} dx = \sqrt{14} \int_{2}^{\infty} \frac{\sqrt{14x^{4}}}{x^{5}} dx = \sqrt{14$$

2. The region bounded by $y = e^{-3x}$ and y = 0 for $x \ge 0$ is rotated about the x – axis. Calculate its volume.





5. a) A vertical dam has a circular gate of radius 4 feet. Find the hydrostatic force against the gate if the top of the gate is 100ft under the water. (7 pts)





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