Test 1 Review

Problem 1. $\displaystyle\int \frac{\cos^3(\ln x)}{x}\,dx$

Problem 2. The force required to hold a spring stretched to a length of 7 m is 5 N. Find the work required to stretch the spring from a length of 4 m to 8 m. The natural length of the spring is 3 m.

Problem 3.
Find the volume of the solid S whose base is bounded by the region $x^2 + 4y^2 = 4$, and cross-sections perpendicular to the y-axis are isosceles triangles with height equal to the base.

Problem 4. Find the area bounded by $x = 3y - y^2$ and $y = -\frac{x}{2}$.

Problem 5. $\displaystyle\int \frac{\ln x}{\sqrt{x}}\,dx$

Problem 6. The region bounded by $y = \dfrac{1}{x^2}$, $x = 1$, $x = e$, and $y = 0$ is rotated around the y-axis. Find the volume.

Problem 7. The region bounded by $x+y^2=4$ and $x-y=2$ is rotated around the line $x=-1$. Set up but do not evaluate an integral representing the volume of the solid.

Problem 8. $\int_0^2 x^2 e^{3x}\,dx$

Problem 9. Find the area bounded by $y = 7 - x^2$ and $y = 2x^2 - 5$.

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Problem 10. Set up but do not evaluate an integral for the volume of the solid obtained by rotating the region bounded by $y = x^2 - x$ and $y = 2$ rotated around the line $x = 3$.

Problem 11. $\displaystyle\int \frac{x^3}{(x^2+1)^8}\,dx$

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Problem 12. Find the volume of the solid obtained by rotating the region bounded by $y = \sqrt{x}$, $y = 2$, and $x = 0$ around the y-axis.

Problem 13. $\int \tan^6 x \sec^4 \, dx$

Problem 14. $\displaystyle\int_0^{\pi/6} \sin^2(5x)\,dx$

Problem 15. Find $\int e^x \sin(8x)\, dx$

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Problem 16. A bucket attached to a 20 pound rope is used to draw water out of an 80 ft well. The bucket weighs 1 pound and holds 26 pounds of water. How much work is done in drawing up one full bucket of water?

Problem 17. Consider the region R bounded by $y = x^3$, $y = 8$, and $x = 0$. Suppose a tank is in the shape of the region R revolved around the y-axis, and the units are measured in meters. If the tank is filled with water to a depth of 3 m, set up but do not evaluate an integral that gives the work done in pumping all the water out of a 1 m high spout. Use ρg for the weight density of water.

Continue work here.