

Attach your own work.

Extra-Credit
problems - Math 150A

Box Answers
Label properly

1. Find areas enclosed by

$$y = x \quad y = \frac{1}{x^2} \quad x = 2$$

2. Find area enclosed by

$$y = 2\sin x \quad y = \sin 2x$$

3. Find area enclosed by

$$x = 2y^2 \quad x = 0 \quad y = 3$$

4. If $\int_0^2 f(x) dx = \pi$, $\int_0^2 7g(x) dx = 7$, $\int_0^1 g(x) dx = 2$

find the following

$$\int_0^2 (g(x) - 3f(x)) dx$$

5. Same as 4) but find $\int_1^2 g(x) dx$

6. Evaluate the following integral

$$\int 2\sqrt{\cos x} \sin x dx$$

7. $\int (2y+1 + 2\cos(2y+1)) dy$

8. $\int \frac{dx}{(x+3)\sqrt{(x+3)^2 - 25}}$

9. $\int \sec x \tan x \sqrt{1 + \sec x} dx$

10. $\int \sqrt{x} \sin(2x^{3/2}) dx$

$$11. \int_1^4 \frac{(1+\sqrt{x})^{1/2}}{\sqrt{x}} dx$$

$$12. \int_{\pi/4}^{3\pi/4} \csc x \cot x dx$$

$$13. \int_0^{\pi/4} \frac{\sec^2 x dx}{(1+7\tan x)^{2/3}}$$

$$14. \int_0^{\pi/2} \frac{3 \sin x \cos x}{\sqrt{1+3\sin^2 x}} dx$$

$$15. \int_0^{\pi/2} 5 (\sin x)^{3/2} \cos x dx$$

$$16. \int_{-\pi/3}^0 \sec x \tan x dx$$

$$17. \int_0^{1/2} x^3 (1+9x^4)^{-3/2} dx$$

$$18. \int (1-x^2-3x^5) dx$$

$$19. \int (1+\tan^2 \theta) d\theta$$

$$20. \int \cos x (\tan x + \sec x) dx$$

21. Find y' by differentiation $\curvearrowright$ implicit

$$y^2 = \sqrt{\frac{1+x}{1-x}}$$

22. ~~xxi~~ $x^3 + 4xy - 3y^{4/3} = 2x$

23. Find the equation of the tangent line to

$$x^{3/2} + 2y^{3/2} = 17 \quad \text{at } x=1$$

24. Find the limit

$$\lim_{x \rightarrow 0} \frac{\sin x}{2x^2 - x}$$

25. $\lim_{x \rightarrow 0} \frac{\sin(\sin x)}{x}$

26. $\lim_{x \rightarrow 0} \frac{3x - \tan 7x}{2x}$

27. Write the area for a circular cone's lateral surface



$$S = \pi r \sqrt{r^2 + h^2}$$

How is ds/dt related to dr/dt if h is constant?

" " dh/dt if r " ?

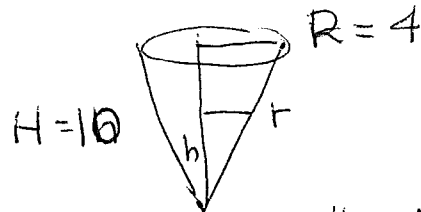
" " dr/dt and dh/dt if

both are not constant?

28. Differentiate $y = \left(\frac{1 + \sin x}{1 - \sin x} \right)^2$

29. Water drains from a conical tank at a rate of $5 \text{ ft}^3/\text{minute}$

How fast is the water level h dropping when $h = 6$ feet?



the dimensions of the cone are $R=4$, $H=10$.

30. Differentiate $y = \sqrt{x} \csc(x+1)^3$

31. Find $\frac{dy^2}{dx^2}$ if $y^3 + y = 2\cos x$, at the point $x=0$, $y=1$.

32. Find the limit $\frac{2x^2+3}{5x^2+7}$

33. For what values of a and b is the following differentiable for all x , and $f'(x)$ continuous.

$$f(x) = \begin{cases} ax & x < 2 \\ ax^2 - bx + 3 & x \geq 2 \end{cases}$$

34 Show that the following function has exactly one zero in the interval $(0, \pi/2)$

$$f(x) = \tan x - \cot x - x$$

35. For what values of a, b, m does $f(x)$ satisfy the hypothesis of the Mean Value Theorem, on the $[0, 2]$ interval.

$$f(x) = \begin{cases} 3 & x=0 \\ a+3x-x^2 & 0 < x < 1 \\ mx+b & 1 \leq x \leq 2 \end{cases}$$

36. Sketch the following - find concavity, max, asymptotes

$$f(x) = \frac{(x+1)^2}{1+x^2}$$

37. $f(x) = \frac{x^3}{3x^2+1}$

38. $f(x) = \frac{x^2-3}{x-2}$

39. $f(x) = x\sqrt{8-x^2}$

40. $f(x) = \frac{\sin x}{1+\cos x}$