

MATH 151: Fall 1995
Exam III: Test Form A

Problem 18, worth 5 points, is extra credit. There are 105 points on this exam.

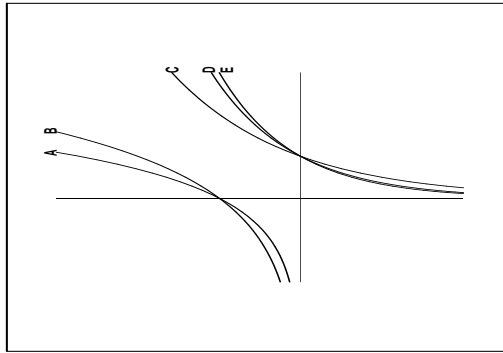
Part I. MULTIPLE CHOICE, NO PART CREDIT, NO CALCULATORS
The SCANTRON forms will be collected at the end of 1 hour.
(5 points each)

1. Simplify $\frac{\sqrt{e^{2x}}}{e^x}$

- (a) 1 (b) e (c) $e^{\sqrt{2x-x}}$ (d) $e^{\sqrt{2/x}}$ (e) $e^{\sqrt{x}}$

2. The graph of $f(x)$ (shown above) consists of a line segment from $(0,0)$ to $(1,1)$ and a line segment from $(1,1)$ to $(3,-1)$.

Find $\int_0^3 f(x) dx$.



- (a) -1 (b) $-1/2$ (c) 0 (d) $1/2$ (e) $3/2$

3. The derivative of e^{5x} is:

- (a) e^{5x} (b) $5e^{5x}$ (c) $5xe^{5x-1}$ (d) $5xe^{5x}$ (e) e^5

4. The derivative of $e^{(e^{2x})}$ is:

- (a) $e^{2x}e^{(e^{2x})}$ (b) $e^{2x}e^{(e^{2x}-1)}$ (c) $2e^{2x}e^{(e^{2x})}$ (d) $e^{(e^{2x})}$ (e) $e^{2x}e^{(2e^{2x})}$

5. Determine $\lim_{h \rightarrow 0} \frac{5^h - 1}{dh}$

- (a) 5 (b) 0 (c) $h5^{h-1}$ (d) $\ln 5$ (e) 1

6. If $f(x) = \ln\left(2\left(\frac{x+3}{x}\right)\right)$, then $f'(x) =$

- (a) $\frac{1}{2}\left(1 + \frac{x}{3}\right)$ (b) $\frac{x}{2x+6}$ (c) $\frac{1}{x+3} - \frac{1}{x}$ (d) $\frac{2x}{2x+6}$ (e) $\frac{1}{2} + \frac{1}{x+3} - \frac{1}{x}$

7. $\sum_{k=1}^4 (k+2)$ is:

- (a) $\frac{1}{2}k^2 + 2k$ (b) 12 (c) $4k+8$ (d) 6 (e) 18

8. Find $\frac{d}{dx} \int_1^x \frac{1}{1+t^3} dt$

(a) $\frac{1}{1+x^3}$ (b) $\frac{1}{1+x^3} - \frac{1}{2}$ (c) $\ln(1+x^3)$ (d) $\frac{3x^2}{1+x^3}$ (e) $\frac{-3x^2}{(1+x^3)^2}$

9. The set of solutions to the equation $\ln x + \ln(x+1) = \ln(x+4)$ is:

(a) 4 only (b) 2 and -2 (c) 3 only (d) 2 only (e) 0 and 3

10. Determine the derivative of $f(x) = (1+x)^{(3x)}$.

(a) $3(1+x)^{(3x-1)}$ (b) $3x(1+x)^{(3x-1)}$ (c) $(1+x)^{(3x)} \ln(1+x)$

(d) $(1+x)^{(3x)} (1 + \ln(1+x))$ (e) $(1+x)^{(3x)} \left(3 \ln(1+x) + \frac{3x}{1+x} \right)$

Part II. WORK OUT PROBLEMS. PART CREDIT will be given. CALCULATORS ARE PERMITTED after the SCANTRONS are collected.

Show all relevant steps in your solution. Clearly indicate your answer. Unsupported answers will not be given credit. Only work shown in the space provided will be graded.

11. (7 points) A function $f(x)$ satisfies $f''(x) = 2x$, $f'(0) = -9$ and $f(0) = 1$. Determine $f(x)$.

12. (7 points) Let $f(x) = x + e^x$ and let $g(x) = f^{-1}(x)$. Find $g'(1)$.

13. (7 points) Find $\int x(x^2 + 1)^{20} dx$

14. (7 points) Approximate $\int_0^{\pi/3} \cos^2 x dx$ with a Riemann sum, using partition points $P = \left\{ 0, \frac{\pi}{4}, \frac{\pi}{3} \right\}$, with x_i^* being the right endpoint of each subinterval.

15. (7 points) Find the inverse function $f^{-1}(x)$ to the function $f(x) = \ln(2x + 3)$.

16. (8 points) a) Sketch the region bounded by the curves $y = 2 - x^2$ and $y = x$.

b) Find the area of this region.

(7 points) The region bounded by $y = 2$ and $y = 1 + x^2$ is revolved around the x -axis. Set up a definite integral, which, if evaluated, will give the volume of the resulting solid. *You need not evaluate this integral.*

(Extra credit: 5 points) An Aggie, driving along at 20 meters/sec, sees a fallen tree in the road ahead of him. He immediately starts braking, with a constant deceleration, and comes to a stop in exactly 350 meters (without hitting the tree). How many seconds did it take for him to stop?