

MATH 140A  
Spring Semester 2001  
Exam II  
March 13, 2001

**ANSWERS:**

1. E; 2. A; 3. E; 4. B; 5. D; 6. D; 7. B; 8. B; 9. C; 10. B; 11. A.

12.

a.  $y' = \cos(\sec 3x) \cdot (\sec 3x \tan 3x) \cdot 3$

b.  $y' = f'(g(x^2)) \cdot g'(x^2) \cdot 2x$

c.  $y' = 5(3 + x \tan^2 x)^4 \cdot [\tan^2 x + x(2 \tan x) \sec^2 x]$

13.

a. i.  $\frac{d}{dx} \sin x = \cos x$ ; ii.  $\frac{d}{dx} \cos x = -\sin x$ ; iii.  $\frac{d}{dx} \tan x = \sec^2 x$ ;

iv.  $\frac{d}{dx} \cot x = -\csc^2 x$ ; v.  $\frac{d}{dx} \sec x = \sec x \tan x$ ; vi.  $\frac{d}{dx} \csc x = -\csc x \cot x$ .

b. 
$$\frac{d}{dx} \cot x = \frac{d \cos x}{dx \sin x} = \frac{(\sin x \cdot -\sin x) - (\cos x \cdot -\cos x)}{\sin^2 x}$$
$$= \frac{-\sin^2 x - \cos^2 x}{\sin^2 x} = \frac{-1}{\sin^2 x} = -\frac{1}{\sin x} \frac{1}{\sin x} = -\csc^2 x.$$

14. a.  $x = \frac{\pi}{2}, \frac{3\pi}{2}$ ; b. there are no such angles; c.  $x = \frac{2\pi}{3}, \frac{4\pi}{3}$ ; d.  $x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}$ .

15.  $\frac{dh}{dt} = \frac{8}{9\pi} m/min.$