

ANSWERS: SAMPLE FINAL 1 FROM GCC MATH WEBSITE

1.  $-\frac{6}{x^3}$

2.  $(\sinh x)^{\tan^{-1} x} \left( \frac{\ln(\sinh x)}{1+x^2} + (\tan^{-1} x)(\coth x) \right)$

3. Two parts:

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

b)  $y = \frac{1}{2}x + \frac{1}{2}$

4.  $\frac{e^y - e^x}{1 - xe^y}$  or  $\frac{e^x - e^y}{xe^y - 1}$

5.  $\frac{5}{2}$

6. Limit does not exist. It's  $\frac{1}{10}$  from one direction and  $-\frac{1}{10}$  from the other.

7. Use  $\lim_{x \rightarrow 3} f(x) = f(3)$  to show

8.  $\frac{1}{2}x - \frac{\sin(8x)}{16} + c$

9.  $\frac{1}{2} \ln\left(\frac{11}{5}\right)$

10.  $\frac{7}{3}$

11.  $-\frac{1}{6}(16 - x^4)^{3/2} + c$

12. Three parts:

a)  $x = 3, 4, 1$

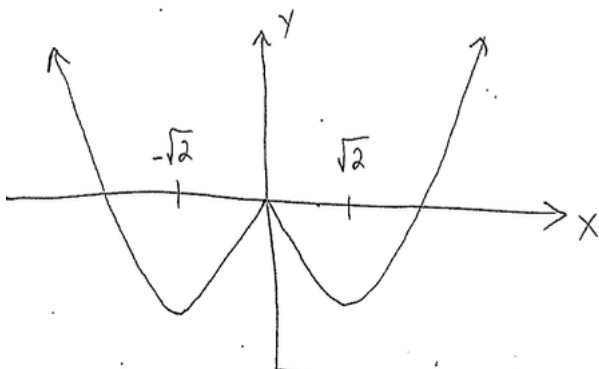
b)  $(0, 1) \cup (3, 4)$

c)  $f'(1.5) < f'(3.5) < f'(0.5)$

13. a) Increasing:  $(-\sqrt{2}, 0) \cup (\sqrt{2}, \infty)$   
 Decreasing  $(-\infty, -\sqrt{2}) \cup (0, \sqrt{2})$

b) local minimum:  $2^{4/3} - 8 \cdot 2^{1/3}$  at  $x = \pm\sqrt{2}$   
 local maximum: 0 at  $x = 0$

c) Graph:



14.  $\approx -0.0259$  rad/sec

15. max: 3 at  $x = 0$ , min:  $-\frac{3}{2}$  at  $\frac{2\pi}{3}$

16.  $(2, 3.5) \cup (5, 6)$