

Multiple Choice

1.(5 pts.) If $f(2) = 5$, $f(3) = 2$, $f(4) = 5$, $g(2) = 6$, $g(3) = 2$ and $g(4) = 0$, find $(fg)(2) + (f \circ g)(3)$.

- (a) 35 (b) 20 (c) 15 (d) 25 (e) 30

2.(5 pts.) Let a function $f(x)$ be given by $f(x) = \begin{cases} 2x + 2 & x > 0 \\ -x + c & x \leq 0 \end{cases}$. For what value of c is f continuous?

- (a) There is no such c . (b) $c = 2$ (c) $c = 3$
(d) $c = 0$ (e) $c = 1$

3.(5 pts.) Compute $\lim_{x \rightarrow 5} \frac{x - 6}{x - 5}$.

- (a) 1.1 (b) $-\infty$
(c) $+\infty$ (d) Does not exist and is not ∞ or $-\infty$.
(e) 0

4.(5 pts.) Compute $\lim_{x \rightarrow 5^+} \frac{x^2 - 25}{x - 5}$.

- (a) $+\infty$ (b) 10 (c) Does not exist and is not $+\infty$.
(d) 0 (e) 5

5.(5 pts.) Find $f'(4)$ if $f(x) = 4\sqrt{x} - \frac{16}{\sqrt{x}}$.

- (a) 2 (b) 4 (c) 0 (d) 3 (e) -1

6.(5 pts.) Find $\frac{df}{dx}$ if $f(x) = (x^2 + 1)(x^3 + 1)$.

- (a) $5x^4 + 8x + 1$ (b) $3x^4(x^3 + 1) + (x^2 + 1)(4x^5)$
(c) $6x^3$ (d) $(x^2 + 1)(x^3 + 1) + (2x)(3x^2)$
(e) $2x(x^3 + 1) + (x^2 + 1)(3x^2)$

7.(5 pts.) Find $f'(3)$ if $f(x) = \frac{x^2 - x}{x + 2}$.

- (a) $\frac{19}{25}$ (b) $\frac{41}{25}$ (c) $\frac{25}{19}$ (d) $\frac{25}{41}$ (e) $\frac{29}{25}$

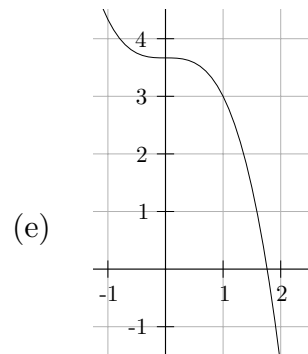
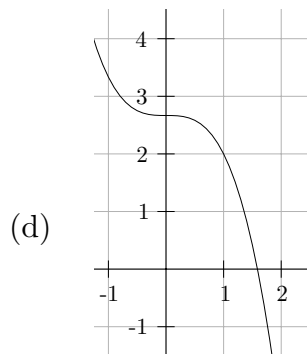
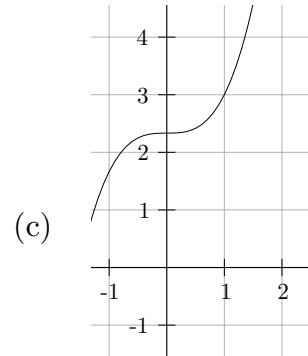
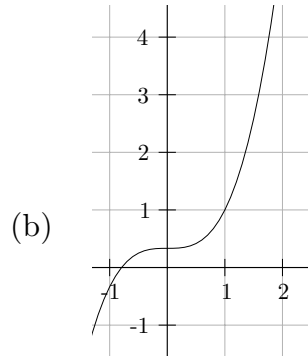
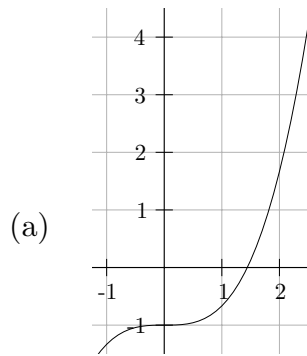
8.(5 pts.) Which line below is the tangent line to the graph of $y = (x^2 - 3x + 1)(x - 3)$ when $x = 3$.

- (a) The tangent line at $x = 3$ is vertical. (b) $y = 2x - 3$
(c) $y = ((2x - 3)(x - 3) + (x^2 - 3x + 1))x - 3$ (d) $y = x - 3$
(e) $y = x + 3$

9.(5 pts.) Given that f and g are differentiable at $x = 3$ and that $f(3) = -1$, $g(3) = 2$, $f'(3) = 3$ and $g'(3) = -4$, what is $\left(\frac{g}{f}\right)'(3)$?

- (a) $-\frac{1}{2}$ (b) -2 (c) $-\frac{2}{9}$ (d) $\frac{1}{2}$ (e) 2

10.(5 pts.) For which graph below is $y = 2x + 1$ a tangent line?



Partial Credit

You must show your work on the partial credit problems to receive credit!

11.(10 pts.) Let $f(x) = \frac{1}{x+1}$.

- (a) Using the limit definition of the derivative, find f' .
- (b) Determine the domain of f' .

12.(10 pts.) Let

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

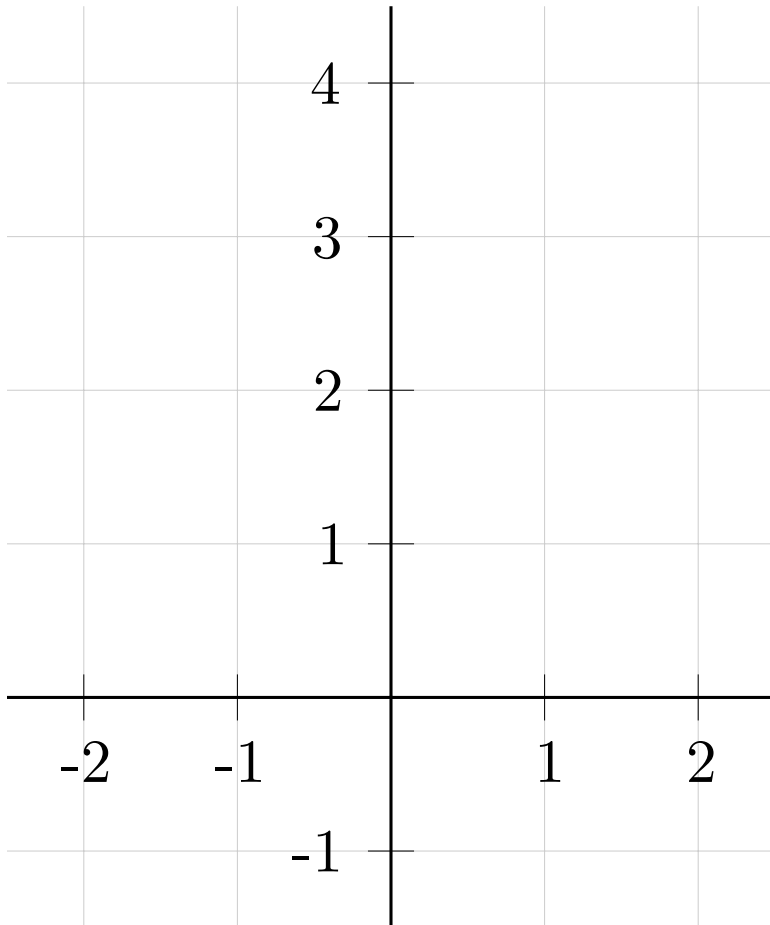
- (a) Compute $f'(x)$.
- (b) Determine where $f'(x) = 0$.

13.(10 pts.) How and why can the Intermediate Value Theorem be used to show that

$$y = f(x) = \frac{x^3 - x - 2}{x + 1}$$

has a root between $x = 1$ and $x = 2$?

14.(10 pts.) Draw the graph of a continuous function $y = f(x)$ with $f(0) = 3$, $f'(0) = -1$, $f'(2) = 0$, and $f'(-2) = 2$.



15.(10 pts.) A ball thrown in the air at 4 m/sec on planet X has height $s(t) = 4t - 3t^2 - t^3$ meters above the surface t seconds after it is thrown.

- (a) Find the velocity at time t .
- (b) Find the velocity when the ball hits the ground.

Name: ANSWERS

Instructor: ANSWERS

Exam I
September 24, 2002

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for one hour.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 6 pages of the test.

Good Luck!

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

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DO NOT WRITE IN THIS BOX!

Total multiple choice: _____

11. _____

12. _____

13. _____

14. _____

15. _____

Total: _____