

**Math 1205 Common Final Exam
Fall 2003**

FORM A

Name: _____
 Pledge: _____
 CRN: _____

Instructions: Please enter your NAME, ID NUMBER, FORM DESIGNATION, and, your CRN on the op-scan sheet. The CRN should be written in the box labeled 'COURSE'. Darken the appropriate circles below your ID number and below the Form designation letter. Use a number 2 pencil. Machine grading may ignore faintly marked circles.

Mark your answers to the test questions in rows 1 through 17 of the op-can sheet. Your score on this test will be the number of correct answers. You have one hour to complete this portion of the exam.

1. Find $\lim_{x \rightarrow -2} \frac{x^2 + x - 2}{x^2 + 3x + 2}$

- 1) 0 2) 1 3) 1/3 4) 3 5) The limit does not exist

2. Below is a table of values for $f(2+h)$ and $\frac{f(2+h)-f(2)}{h}$ for h ranging from $-.1000$ to $-.0001$ and from $.1000$ to $.0001$.

h	$f(2+h)$	$\frac{f(2+h)-f(2)}{h}$	h	$f(2+h)$	$\frac{f(2+h)-f(2)}{h}$
-0.1000	16.1200	11.2000	0.1000	13.9200	10.8000
-0.0100	15.1102	11.0200	0.0100	14.8902	10.9800
-0.0010	15.0110	11.0020	0.0010	14.9890	10.9980
-0.0001	15.0011	11.0002	0.0001	14.9989	10.9998

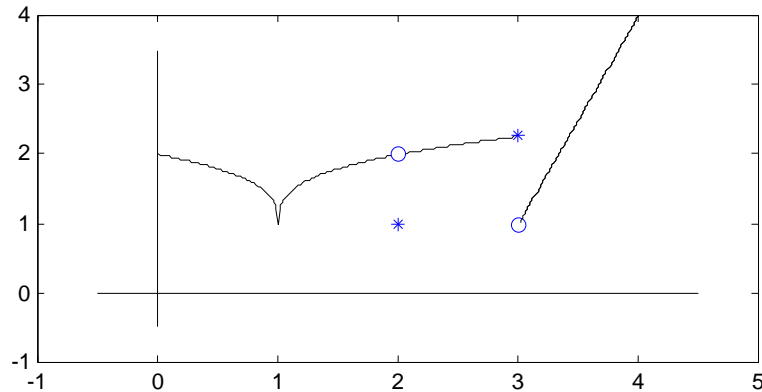
Which of the following statements is NOT supported by the data?

- 1) $\lim_{x \rightarrow 0} f(x) = 15$ 2) $\lim_{x \rightarrow 2} f(x) = 15$ 3) $f(2) = 11$
 4) The secant line through the points $(2, f(2))$ and $(19, f(1.9))$ has slope 11.2
 5) The tangent line at the point $(2, f(2))$ has slope approximately 11

3. At how many points on the graph of $y = x^3 - 9x^2 + 45x + \sqrt{3}$ does the tangent line have slope 18?

- 1) none 2) 1 3) 2 4) 3 5) infinitely many

4. The graph of the function $y = f(x)$ is shown below.



The Graph of $y = f(x)$

Which of the following statements is FALSE?

- 1) $\lim_{x \rightarrow a} f(x)$ does not exist if $a = 2$ and if $a = 3$
- 2) f is continuous except at $x = 2$ and at $x = 3$
- 3) f has a removable discontinuity at $x = 2$
- 4) f is differentiable except at $x = 1$, $x = 2$, and $x = 3$

5. Following is a table of values for f , g , f and g .

x	$f(x)$	$g(x)$	$f(x)$	$g(x)$
2	3	5	-1	-3
5	-1	-3	6	4

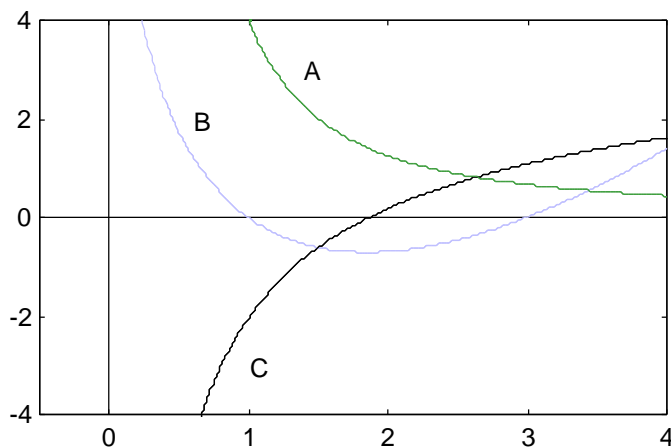
Which of the following is FALSE?

- 1) If $h(x) = f(g(x))$ then $h(2) = -18$
- 2) If $k(x) = f(x)g(x)$ then $k(2) = -14$
- 3) If $m(x) = (f(x))^3$ then $m(5) = 18$
- 4) If $n(x) = \frac{f(x)}{g(x)}$ then $n(5) = \frac{3}{2}$

6. If $f(x) = x^2 \sin x$ then $f'(x)$ equals

- 1) $-2 \sin x$
- 2) $2x \sin x + x^2 \cos x$
- 3) $(2 - x^2) \sin x + 4x \cos x$
- 4) $2 \sin x + 4x \cos x + x^2 \sin x$
- 5) $2 \cos x - 2x \sin x$

7. The following picture shows the graphs of f , f' , and f'' . Identify each curve.



- $f = C$ $f = A$ $f = B$ $f = A$
 1) $f = B$ 2) $f = B$ 3) $f = C$ 4) $f = C$
 $f = A$ $f = C$ $f = A$ $f = B$

8. If $f(x) = \frac{\cos x}{x^3 - 1}$, then $f'(x)$ equals

- 1) $\frac{-(x^3 - 1)\sin x - 3x^2 \cos x}{(x^3 - 1)^2}$ 2) $\frac{3x^2 \cos x + (x^3 - 1)\sin x}{(x^3 - 1)^2}$
 3) $\frac{-\sin x}{3x^2}$ 4) $\frac{-(x^3 - 1)\sin x - 3x^2 \cos x}{x^3 - 1}$

9. The tangent line to the graph of $f(x) = 3 + 2(\ln x)$ at the point (1,3) has equation

- 1) $y - 3 = \frac{2}{x}(x - 1)$ 2) $y = 3x$
 3) $y = 2x - 5$ 4) $y = 2x + 2$ 5) $y = 2x + 1$

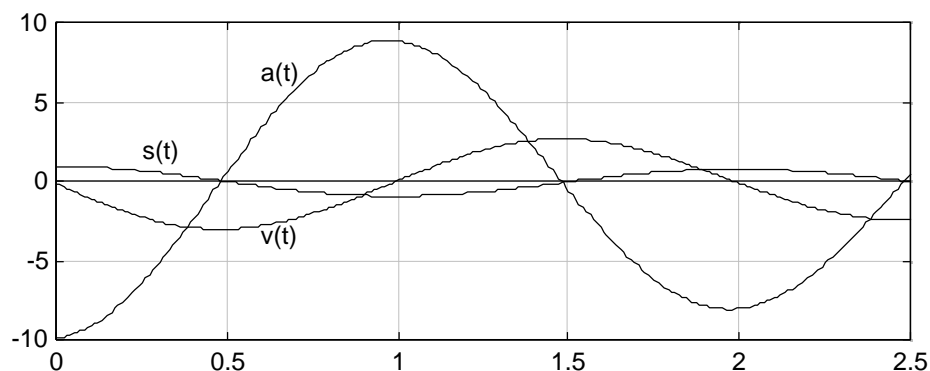
10. Which of the following is FALSE?

- 1) If $f(x) = x^2 + \frac{1}{x^2} + e^\pi + \sin \pi$ then $f'(x) = 2x - \frac{2}{x^3}$
 2) If $g(x) = \tan(\ln x)$ then $g'(x) = \frac{\sec^2(\ln x)}{x}$
 3) If $h(x) = \sin^{-1}(x^2)$ then $h'(x) = \frac{1}{\sqrt{1 - x^4}}$
 4) If $k(x) = e^{\sec x}$ then $k'(x) = (\sec x \tan x)e^{\sec x}$

11. If the function $y = f(x)$ is defined implicitly by the equation $y^3 + 3xy^2 + \cos x = 6$ then $\frac{dy}{dx}$ equals

- 1) $6y^2 + 6xy - \sin x$ 2) $\frac{\sin x - 3y^2}{3y^2 + 6xy}$
 3) $\frac{\sin x}{3y^2 + 6xy}$ 4) $\frac{\sin x - 3y^2 - 6xy}{3y^2}$

12. The position, $s(t)$, the velocity, $v(t)$, and the acceleration, $a(t)$, of a particle moving along a horizontal coordinate line (in which the positive direction is to the right) are graphed below.



Which of the following is FALSE?

- 1) The particle is slowing down approximately over the intervals $(0, .49)$ and $(1.49, 2.49)$
- 2) The particle is speeding up approximately over the intervals $(0, .49)$, $(1, 1.49)$, and $(2, 2.49)$
- 3) The particle is moving left approximately on the intervals $(0, 1)$ and $(2, 2.5)$
- 4) The particle is to the left of the origin approximately over the interval $(.5, 1.5)$

13. If $f(x) = x^{6/5} - 6x^{1/5}$ then $f'(x) = \frac{6(x-1)}{5x^{4/5}}$. On the interval $[-1, 32]$ which of the following is FALSE?

- 1) The critical numbers for f are $x = 0$ and $x = 1$.
- 2) f has neither a local maximum nor a local minimum at $x = 0$.
- 3) f has a local maximum at $x = 1$.
- 4) The absolute maximum value for f is 52.
- 5) The absolute minimum value for f is -5 .

14. If $y = \ln \frac{x}{4}$ and the value of x decreases from 4 to 3.9 then the corresponding change in y is approximated by the differential dy , which equals:

- 1) $-.025$ 2) $.025$ 3) 0 4) $.01$ 5) $-.01$

15. A function f has first derivative $f'(x) = (x - 2)^2(x - 5)$ and second derivative $f''(x) = 3(x - 2)(x - 4)$. Which of the following statements is FALSE?

- 1) f is increasing on the interval $(5, \infty)$
- 2) f has a local maximum at $x = 2$
- 3) f has a local minimum at $x = 5$
- 4) f is concave down in the interval $(2, 4)$
- 5) f has points of inflection at $x = 2$ and $x = 4$

16. A box with an open top is to have a square base and a volume of 32 ft^3 . What dimensions (width and height) minimize the amount of material required (i.e the surface area in ft^2) to construct the box?

- 1) Width and height are $\sqrt[3]{32}$
- 2) The width is $\sqrt{\frac{32}{3}}$ and the height is 3
- 3) The width is 2 and the height is 8
- 4) The width is 4 and the height is 2.

17. The Taylor polynomial of degree four generated by $f(x) = \sin x$ and centered at $a = \frac{\pi}{2}$ is:

- 1) $\sin x + \cos x(x - \frac{\pi}{2}) - \frac{\sin x}{2}(x - \frac{\pi}{2})^2 - \frac{\cos x}{6}(x - \frac{\pi}{2})^3 + \frac{\sin x}{24}(x - \frac{\pi}{2})^4$.
- 2) $1 - \frac{1}{2}x^2 + \frac{1}{24}x^4$.
- 3) $1 - \frac{1}{2}(x - \frac{\pi}{2})^2 + \frac{1}{24}(x - \frac{\pi}{2})^4$
- 4) $1 - (x - \frac{\pi}{2})^2 + (x - \frac{\pi}{2})^4$