

Name:

Section:

Zid:

No Scratch paper outside of the Exam book is permitted!

Directions: On the answer sheet, fill in the following in the appropriate spaces and darken the corresponding ovals:

1. Last name, first and middle initials.
2. Student Z Number. (LEFT-justify the 6 digits in the ID field leaving the last 3 spaces blank.)
3. Section:

A1=11

A2=12

A3=13

B1=21

B2=22

B3=23

C1=31

C2=32

C3=33

D1=41

D2=42

D3=43

4. Your signature on the back.

Problems: Check that your exam contains exactly 20 problems. Each problem is worth 5 points. Circle the answer on the exam and darken the corresponding oval on the answer sheet.

1. Simplify $\frac{(2\sqrt{5} - 3)(\sqrt{5} + 1)}{\sqrt{5} - 2}$.

(a) $\frac{7\sqrt{5} - 14}{3}$

(d) $\frac{5\sqrt{5} + 9}{3}$

(b) $7\sqrt{5} + 14$

(e) $5\sqrt{5} + 9$

(c) 1

2. Factor the expression $x^{1/2}(x^2 + x) - 3x^{3/2} - 3x^{1/2}$ (where $x \geq 0$).

(a) $x^{1/2}(x + 1)(x - 3)$

(d) $x^{1/2}(x + 6)(x - 4)$

(b) $x^{3/2}(x + 1)(x - 3)$

(e) $(x + 6)(x - 4)$

(c) $x^{3/2}(x + 2)(x - 6)$

3. What is the domain of the function f defined by $f(x) = \frac{x + 2}{\sqrt{5 + 3x}}$?

(a) $(-\infty, 0]$

(d) $(-5/3, \infty)$

(b) $(-\infty, 0)$

(e) $(-\infty, -5/3)$

(c) $(-2, \infty)$

4. Find the domain of $\log(4x^3 - x^5)$.

(a) $\{x : -2 < x < 2\}$

(d) $\{x : x < -2 \text{ or } 0 < x < 2\}$

(b) $\{x : -2 < x < 0 \text{ or } x > 2\}$

(e) $\{x : x < -2 \text{ or } x > 2\}$

(c) $\{x : x < 2\}$

5. Simplify $\frac{2^{\sqrt{5}+1}}{2^{\sqrt{5}-1}}$

(a) 1

(d) $2^{2\sqrt{5}}$

(b) 4

(e) 32

(c) 16

6. If $f(t) = \frac{1}{t} + 1$, then $f^{-1}(t) =$

(a) $\frac{-1}{t} + 1$

(d) $\frac{1}{t-1}$

(b) $\frac{1}{t} - 1$

(e) $\frac{t}{t+1}$

(c) $\frac{1}{t+1}$

7. Which is the largest?

(a) $\log(90)$

(d) $\log_2(15)$

(b) $\ln(e^3)$

(e) $\ln(e^{-8})$

(c) $\log_2(31)$

8. If $f(x) = \frac{x}{x^2 + 3}$ then $f(3 + h) =$

(a) $3 + \frac{h}{h^2 + 3}$

(d) $\frac{h + 3}{h^2 + 3}$

(b) $\frac{3}{3^2 + 3} + \frac{h}{h^2 + 3}$

(e) $\frac{h + 3}{(h + 3)^2 + 3}$

(c) 3

9. What is the average rate of change of $s(t) = 7t^2$ on $[2, 5]$?

(a) 7

(d) 147

(b) 49

(e) None of the above

(c) 63

10. Find the solution(s) of the equation $e^{3x+5} = 2$.

(a) -1

(d) $\frac{\ln 2 - 5}{3}$

(b) 1

(e) $\frac{\ln 0 + \ln 2 - 5}{3}$

(c) $\frac{-4 \ln 3}{3}$

11. Simplify $[\log_5(9)][\log_3(5)]$

(a) 2

(d) $\log_{15}(45)$

(b) 3

(e) $\log_8(14)$

(c) 4

12. Solve $5^{-4x} = 2^{7+3x}$

- (a) $x = 1$ (d) $x = \frac{(-7 \ln 2)}{(3 \ln 2 - 4 \ln 5)}$
(b) $x = \frac{(-7 \ln 2)}{(3 \ln 2 + 4 \ln 5)}$ (e) $x = \frac{(7 \ln 2)}{(3 \ln 2 + 4 \ln 5)}$
(c) $x = \frac{-2}{13}$

For the next two problems:

$$f(x) = \frac{x+6}{3x-6} \quad \text{and} \quad g(x) = \frac{x+1}{x-2}.$$

13. The composition $g \circ f(x)$ is

- (a) $\frac{4x}{-5x+18}$ (d) $\frac{x+6}{3x+3}$
(b) $\frac{7x-11}{-3x+15}$ (e) none of these
(c) $\frac{3x+3}{x+6}$

14. The quotient $\left(\frac{g}{f}\right)(x)$ is

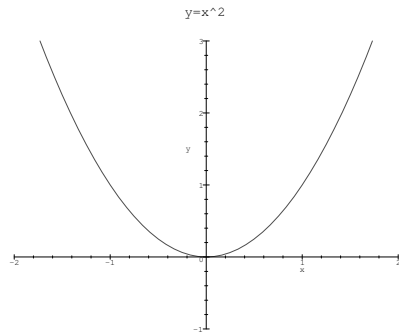
- (a) $\frac{4x}{-5x+18}$ (d) $\frac{x+6}{3x+3}$
(b) $\frac{7x-11}{-3x+15}$ (e) none of these
(c) $\frac{3x+3}{x+6}$

15. Which of the following is **always** true for a *general* exponential function $F(x) = b^x$, $b > 0, b \neq 1$?

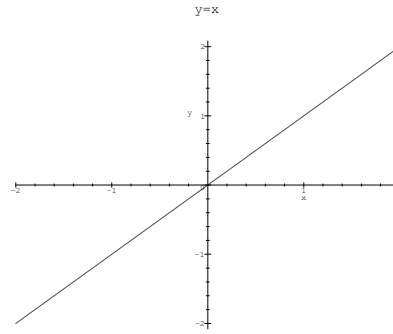
- (a) The function is increasing (d) The x-axis is an asymptote
(b) The function is decreasing (e) The graph crosses the x-axis at $x = 1$
(c) The y-axis is an asymptote

For the next two problems: let $f(x) = (5 - x)^3$.

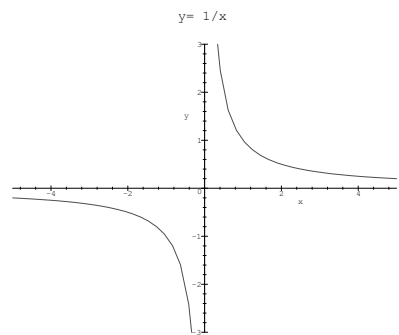
16. The graph of f may be obtained by shifting and/or reflecting that of which "basic function"?



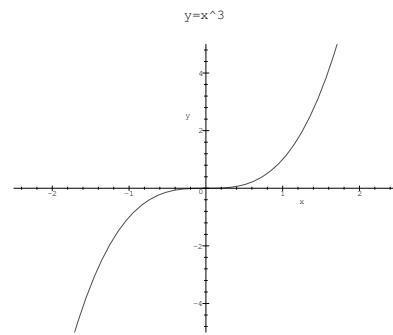
(a)



(b)



(c)



(d)

(e) none of these

17. To obtain the graph of $f(x)$ we can

- (a) shift the graph of the basic function right 5 units then reflect around the x -axis.
- (b) shift the graph of the basic function up 5 units then reflect around the y -axis.
- (c) shift the graph of the basic function left 5 units then reflect around the y -axis.
- (d) shift the graph of the basic function left 5 units then reflect around the x -axis.
- (e) none of the these

18. A wire of length x is bent into the shape of a square. Express the area A of the square as a function of x .

(a) $A(x) = x^2$

(d) $A(x) = 2x^2$

(b) $A(x) = 4x^2$

(e) none of these

(c) $A(x) = \frac{x^2}{4}$

19. Solve $3(2^{2x}) - 5(2^x) + 2 = 0$

(a) $x = 0$ is the only solution

(d) $x = 0$ or $x = 1 - \log_2(3)$

(b) $x = 1$ is the only solution

(e) $x = 1$ or $x = 1 - \log_2(3)$

(c) $x = 2$ is the only solution

20. Which of the following is **always** true for a *general* logarithm function $G(x) = \log_b(x)$, $b > 0, b \neq 1$?

(a) The function is increasing

(d) The x-axis is an asymptote

(b) The function is decreasing

(e) The graph crosses the y-axis at $x = 1$

(c) The y-axis is an asymptote