

PART I – SAMPLE INTERMEDIATE ALGEBRA PLACEMENT EXAM

ARITHMETIC

Put your answer in simplest form; for example, if you get $\frac{2}{4}$ for an answer, you would change it to $\frac{1}{2}$.

1. $-5 + 7$
2. $-5 - 7$
3. $-5 - (-7)$
4. $7 - 5(2 - 8)$
5. $\frac{1}{4} + \frac{3}{10}$
6. $\frac{5}{12} - \frac{1}{8}$
7. $\frac{1}{3} - (-\frac{7}{9})$
8. $-7(-1)(-5)$
9. $\frac{4}{3} \cdot \frac{5}{6} \cdot \frac{9}{20}$
10. $\frac{5}{12} \div (-\frac{7}{8})$
11. $\frac{30}{\frac{9}{2}}$
12. $\frac{\frac{4}{15}}{\frac{2}{9}}$
13. $5(4 - 2)^2 - 9/3 + 5$
14. $0/5$
15. $\frac{9^{-2}}{2^{-4}}$
16. 12345^0
17. $\sqrt{\frac{9}{25}}$
18. $\sqrt{64 + 36}$
19. $\sqrt{10^2 - 8^2}$
20. $\sqrt[5]{-32}$
21. $16^{3/2}$
22. $(-1)^{10} + (-1)^9$
23. $\sqrt{18} - \sqrt{8}$
24. -3^2
25. $(1.2 \times 10^5) \cdot (0.35 \times 10^{-3})$

ALGEBRAIC OPERATIONS

Perform the indicated operations, then simplify your result; your answer should contain only positive exponents.

1. $(-5x^2y^{-3}z^{-2})(-2x^5y^3z^{-2})$
2. $(-2c^3)^4$
3. $\frac{12x^2y^{-3}z^4}{40x^2y^{-2}z^2}$

$$5. \frac{3}{x^2 - 2x} - \frac{2}{x}$$

$$6. \frac{x^2 - 9}{xy + y} \div \frac{x + 3}{y}$$

$$7. \sqrt{\frac{c^8f^4}{81}}$$

$$8. \sqrt{9x^2 + 9y^2}$$

$$9. (2x^2y - 5xy^2 + 4y) - (3x^2y - 6xy^2 + 5xy)$$

$$10. (x + y)^2 - (x - y)^2$$

$$11. -x^2 + (-x)^2$$

$$12. 4(x - 3) + 9(x - 2) + 5$$

$$13. 5(2x - 4) - 2(4 - 7x)$$

$$14. \frac{x^2 + 4x - 12}{x^2 + 12x + 36}$$

$$15. (2x - 3y)(2x + 3y)$$

$$16. (x - 2) / (2 - x)$$

SOLVING EQUATIONS AND INEQUALITIES

Solve for x in simplest form. (Real number solutions only!)

$$1. 4(x - 2) = 8(x + 3)$$

$$2. x^2 + 64 = 0$$

$$3. x^2 - 64 = 0$$

$$4. x^2 - 3x - 10 = 0$$

$$5. 3x^2 - 2x - 2 = 0$$

$$6. 2x^2 - 3x + 4 = 0$$

$$7. \frac{x + 4}{x - 4} = \frac{x + 2}{x}$$

$$8. \frac{4x - 5}{3x + 7} = 0$$

$$9. x^2(5x + 2)(4x - 1) = 0$$

$$10. -3x + 11 > 32$$

$$11. |x - 3| < 4$$

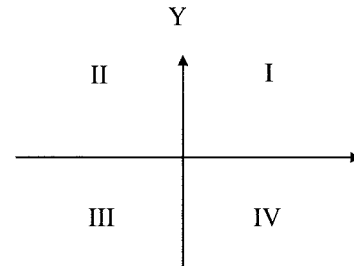
$$12. |x + 5| > 4$$

$$13. x^2 < 4$$

$$14. 4z^2 = 2x + 9 \text{ (solve for } x \text{ symbolically)}$$

COORDINATES AND GRAPHS

For questions asking for quadrants, use the numbering below.

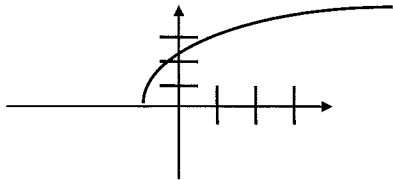


1. What quadrant is each of the following in:
a. (2, -3) b. (-2, 3) c. (-2, -3)
2. For the points (-3, 1) and (4, -4):
a. Find the midpoint between the two points.
b. Find the distance between the two points.
3. Find an equation of the circle with center (-6, 1) and radius 9.
4. Find the center and radius of the circle:
$$x^2 + y^2 + 10x - 6y - 11 = 0$$
5. What points lie on the graph of:
 $x^2 + y^2 = 9$, if $y = 1$?
6. The y-intercept of $y = \frac{3x - 4}{7x + 8}$ is:
7. In what two quadrants are the following graphs?
a. $y = x^2 + 4$
b. $y = 1/x$
c. $y = -x^3$

PART II – SAMPLE FUNCTIONS PLACEMENT EXAM

BASIC FUNCTIONS

1. Consider this graph of $y = f(x)$:



- What is the domain of $f(x)$?
- What is the range of $f(x)$?
- What is $f(0)$? (approximate)
- For what value of x does $f(x) = 3$? (approximate)

2. What is the domain of:

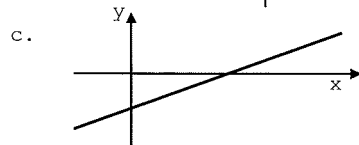
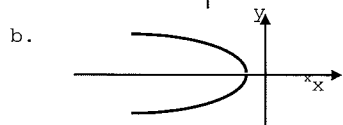
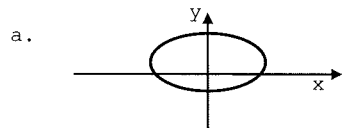
a. $f(x) = \sqrt{x - 3}$

b. $f(x) = \frac{9}{x^2 - 4}$

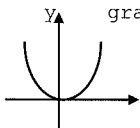
3. Let $f(x) = 4 - x^2$ and $g(x) = 2x + 1$. Find and simplify:

- $f(-3)$
- $f(2s)$
- $f(g(x))$

4. Which graphs below can be graphs of functions $y = f(x)$?



5. Given this graph of $y = f(x)$, graph: a. $f(x) + 2$



LINES AND PARABOLAS

- What is the slope of the line through $(-5, 2)$ and $(1, -7)$?
- Graph the lines:
 - $y = -3x + 4$
 - $3x + 2y = 6$
- Are $4x + 3y = 7$ and $12x - 9y = 3$ parallel?
- Find an equation of the line through $(4, -5)$ that is perpendicular to the line $y = \frac{2}{3}x - 1$.
- Use algebra to find the intersection of the lines: $2x + y = 4$ and $x + 3y = 7$
- Consider the graph: $y = -x^2 + 3x + 4$.
 - Find the y -intercept.
 - Find the x -intercepts.
 - Find the vertex.
 - Sketch the graph.
- How many x -intercepts does each of the following graphs have? (You should not have to graph them!)
 - $y = -x^2 + 2x - 3$
 - $y = x^2 - 2x - 3$
 - $y = x^2 - 8x + 16$
 - $y = -x^2 + 3$

EXPONENTIALS AND LOGARITHMS

1. Let $f(x) = \frac{1}{5}(2^x)$. Fill in the following table and use them to sketch the full graph of $f(x)$.

| x | y |
|-----|-----|
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

- Expand as far as possible via \log rules.

$$\log_b \frac{a^3}{b^4 c^5}$$
- Rewrite using just one \log .

$$\frac{\log x - 4\log y - 7\log z}{2}$$

- Find:
 - $\log_3(1/9)$
 - $\log_{41}(1)$
 - $\log_{52}(52)$
 - $\log_{63}(63^{74})$
- Between which two consecutive integers is $\log_5 198$?
- Solve for t in terms of common logs: $7^t = 923$.
- For positive x and y , $\frac{\log x}{\log y}$ can also be written as:
 - x/y
 - $\log x - \log y$
 - $\log(x/y)$
 - none of the above
- Graph the function $y = 2^{-x}$.

TRIGONOMETRY AND TRIG FUNCTIONS

- Find each of the following:
 - $\cos 240^\circ$
 - $\tan(-45^\circ)$
 - $\sin 150^\circ$
 - $\sec 180^\circ$
- Convert 12° to radians.
 - Convert $\pi/5$ radians to degrees.
- Find each of the following:
 - $\sin^2 4x + \cos^2 4x$
 - $\cos 6\pi$
 - $-\sin(3\pi/2)$
- Find $\tan^2 2x$ when $x = \pi/3$.
- Let $f(x) = -3\sin 2x$.
 - What is the amplitude?
 - What is the period?
 - Graph one full cycle of $f(x)$ starting from $x = 0$.
- Which one of the three trig. functions $\sin x$, $\cos x$ or $\tan x$ DOES NOT pass through the origin?
- You need an angle of elevation of 30° to view a bird flying at a height of 1000 feet. What is your distance from the bird?

SOLUTIONS TO PRETEST INTERMEDIATE ALGEBRA

ARITHMETIC

1. 2 2. -12 3. 2 4. 37 5. $11/20$ 6. $7/24$ 7. $10/9$ 8. -35 9. $1/2$
10. $-10/21$ 11. $20/3$ 12. $6/5$ 13. 22 14. 0 15. $16/81$ 16. 1 17. $3/5$
18. 10 19. 6 20. -2 21. 64 22. 0 23. $\sqrt{2}$ 24. -9 25. 42

ALGEBRAIC OPERATIONS

1. $10x^7/z^4$ 2. $16c^{12}$ 3. $(3z^2)/(10y)$ 4. $-2x^3+13x^2-17x+10$ 5. $(7-2x)/(x^2-2x)$ 6. $(x-3)/(x+1)$
7. $c^4t^2/9$ 8. $3\sqrt{x^2+y^2}$ 9. $-x^2y+xy^2-5xy+4y$ 10. $4xy$ 11. 0 12. $13x-25$ 13. $24x-28$
14. $(x-2)/(x+6)$ 15. $4x^2-9y^2$ 16. -1

SOLVING EQUATIONS AND INEQUALITIES

1. $x = -8$ 2. no real solutions 3. $x = -8, 8$ 4. $x = -2, 5$ 5. $x = (1-\sqrt{7})/3, (1+\sqrt{7})/3$
6. no real solutions 7. $x = -4/3$ 8. $x = 5/4$ 9. $x = -2/5, 0, 1/4$ 10. $x < -7$
11. $-1 < x < 7$ 12. $x < -9$ or $x > -1$ 13. $-2 < x < 2$ 14. $x = 2z^2 - (9/2)$

COORDINATES AND GRAPHS

1. (a) IV (b) II (c) III 2. (a) $(1/2, -3/2)$ (b) $\sqrt{74}$ 3. $(x+6)^2+(y-1)^2 = 81$ 4. ctr. $(-5, 3)$; rad. $\sqrt{45}$
5. $(-\sqrt{8}, 1), (\sqrt{8}, 1)$ 6. $-1/2$ 7. (a) I and II (b) I and III (c) II and IV

FUNCTIONS AND GRAPHS

BASIC FUNCTIONS

1. (a) $[-1, \infty)$ (b) $[0, \infty)$ (c) 2 (d) 1 2. (a) $x \geq 3$ (b) $x \neq -2, 2$
3. (a) -5 (b) $4 - 4s^2$ (c) $-4x^2 - 4x + 3$ 4. only (c) 5. (a) (b) use graphing calculator*, e.g. with $f(x) = x^2$

LINES AND PARABOLAS

1. $-3/2$ 2. (a) (b) use graphing calculator* 3. no 4. $y = -(3/2)x + 1$ 5. $x = 1, y = 2$
6. (a) 4 (b) -1 and 4 (c) $(3/2, 25/4)$ (d) use graphing calculator*
7. (a) none (b) two (c) one (d) two

EXPONENTIALS AND LOGARITHMS

1. use graphing calculator* 2. $3\log_b a - 4 - 5\log_b c$ 3. $\log(x/(y^4z^7))^{1/2}$ 4. (a) -2 (b) 0 (c) 1 (d) 74
5. 3 and 4 6. $\log 923/\log 7$ 7. (d) 8. use graphing calculator*

TRIGONOMETRY AND TRIG FUNCTIONS

1. (a) $-1/2$ (b) -1 (c) $1/2$ (d) -1 2. (a) $\pi/15$ rad (b) 36° 3. (a) 1 (b) 1 (c) 1 4. $-3\sqrt{3}$
5. (a) 3 (b) π (c) use graphing calculator* 6. $\cos x$ 7. 2000 feet

* Graphing calculator mentioned here solely as a means of checking your answers for pretest. Calculators of any type are NOT permitted for the placement test itself.