Sample Math Placement Test for Architecture Students

Duration: 60 minutes

- 1. Turn off your mobile phones.
- 2. <u>Calculators are not allowed.</u>

You have 20 multiple choice questions, each with 4 possible answers. Only one of the 4 possible answers is correct.

- 1. In the *xy*-plane, we have y < -x + 2a and y > x + b. If (0, 0) is a solution to the system of inequalities above, which of the following relationships between *a* and *b* must be true?
 - a) 2a < b
 - b) **b** < 2**a**
 - c) 2|a| > |b|
 - d) 2a = -b
- 2. Which of the following is an equation of a circle in the xy-plane with center (4, 0) and a radius with endpoint $(5, \frac{4}{3})$?
 - a) $(x-4)^2 + y^2 = \frac{25}{9}$ b) $(x-4)^2 + y^2 = \frac{5}{3}$ c) $(x+4)^2 + y^2 = \frac{5}{3}$ d) $(x+4)^2 + y^2 = \frac{25}{9}$
- 3. The expression $3^x 9^x$ is equal to:
 - a) 3^{2x} b) 9^{2x}
 - c) 3^{x^2}
 - d) 3^{3x}

4. If the total cost of x books is \$10 cents, what is the cost of y apples?



5. In the xy plane above, line l is parallel to line k. What is the value of p?



- a) 4b) 8c) 1
- c) 10
- d) 5
- 6. The equation of the tangent line to the graph of equation $y = x^2$ at the point (1, 1) is given by:
 - a) y = 2x 1
 - b) y = 2x + 1
 - c) y = x 1
 - d) y = x + 1
- 7. If f(x) = 2x 2, then f(x 2) =
 - a) $4x^2 6x + 2$
 - b) 2*x* 4
 - c) 2x 6
 - d) 8x 10

- 8. The sum of the solutions of the quadratic equation $x^2 + 6x 2 = 0$ is
 - a) 6 b) -6c) $\sqrt{44}$ d) -12
- 9. The derivative of $f(x) = x^{-2}$ is
 - a) $-2x^{-1}$ b) x^{-1} c) $2x^{-3}$ d) $2x^{-1}$
- 10. Solutions of |3x 8| = 7 are
 - a) $x = 5 \text{ or } \frac{1}{3}$ b) x = 5c) $x = \frac{1}{3}$ d) $x = 5 \text{ and } x = \frac{1}{3}$
- 11. In this figure, if every angle in the polygon is a right angle, then what is the perimeter of the polygon?



- 12. If the perimeter of a square is 16, which of the following is the length of its diagonal?
 - a) $2\sqrt{2}$ b) 4
 - c) $4\sqrt{2}$
 - d) $8\sqrt{2}$
- 13. In the following figure, the lines (AB) and (CD) are parallel. Find the angle x in terms of angles y and z.



a)
$$x = y + z$$

- b) $x = 180^{\circ} y z$
- c) x = -y + z
- d) $x = 90^{\circ} y z$
- 14. Consider the following triangle $(a \neq b)$. Then,



15. Simplify the radical expression $\frac{\sqrt{9x^2} - 4\sqrt{x^3}}{3 - 4\sqrt{x}}$, x > 0

a) x
b) -x
c) 2x

d) $x\sqrt{x}$

16. Assume that $\sin x = \frac{1}{2}$ and $\frac{\pi}{2} \le x \le \pi$. The value of $\cos x$ is

a) $\frac{\sqrt{3}}{2}$ b) $-\frac{\sqrt{3}}{2}$ c) $-\frac{1}{2}$ d) $\frac{1}{2}$

17. The antiderivative of 2x is given by

a) 6x + cb) $\frac{3}{2}x^2 + c$ c) $x^2 + c$ d) $3x^2 + c$

18. The area of a semi-circle is $2\pi cm^2$. The diameter of the circle is

a) 4 cm
b) 2 cm
c) 6 cm
d) 16 cm

19. Solve for x the equation $\frac{1}{x-6} = \frac{3}{5x+1}$ a) $-\frac{19}{2}$ b) $-\frac{7}{2}$ c) $\frac{19}{2}$ d) $-\frac{12}{4}$

20. Consider the system of equations

$$\begin{cases} 2y + 3x = 38\\ y - 2x = 12 \end{cases}$$

Then,
$$\frac{y}{x} =$$

a) 8

b) 16

c) 2

d) 10