# Sample Math Placement Test for Architecture Students Duration: 60 minutes 

## 1. Turn off your mobile phones.

2. Calculators are not allowed.

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

1. In the $x y$-plane, we have $y<-x+2 a$ 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) $2 a<b$
b) $b<2 a$
c) $2|a|>|b|$
d) $2 a=-b$
2. Which of the following is an equation of a circle in the $x y$-plane with center $(4,0)$ and a radius with endpoint $\left(5, \frac{4}{3}\right)$ ?
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) $3^{2 x}$
b) $9^{2 x}$
c) $3^{x^{2}}$
d) $3^{3 x}$
4. If the total cost of $x$ books is $\$ 10$ cents, what is the cost of $y$ apples?
a) $\frac{10}{x y}$
b) $\frac{10 y}{x}$
c) $\frac{y}{10 x}$
d) $\frac{10 x}{y}$
5. In the $x y$ plane above, line $l$ is parallel to line $k$. What is the value of $p$ ?

a) 4
b) 8
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) $y=2 x-1$
b) $y=2 x+1$
c) $y=x-1$
d) $y=x+1$
7. If $f(x)=2 x-2$, then $f(x-2)=$
a) $4 x^{2}-6 x+2$
b) $2 x-4$
c) $2 x-6$
d) $8 x-10$
8. The sum of the solutions of the quadratic equation $x^{2}+6 x-2=0$ is
a) 6
b) -6
c) $\sqrt{44}$
d) -12
9. The derivative of $f(x)=x^{-2}$ is
a) $-2 x^{-1}$
b) $x^{-1}$
c) $2 x^{-3}$
d) $2 x^{-1}$
10. Solutions of $|3 x-8|=7$ are
a) $x=5$ or $\frac{1}{3}$
b) $x=5$
c) $x=\frac{1}{3}$
d) $x=5$ 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?

a) 34
b) $\mathbf{4 2}$
c) 47
d) 52
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 $(A B)$ 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,

a) $\cos \alpha=\frac{a}{c}$ and $\tan \beta=\frac{b}{a}$
b) $\cos \alpha=\frac{b}{c}$ and $\tan \beta=\frac{a}{b}$
c) $\sin \alpha=\cos \beta=\frac{a}{c}$
d) $\cos \alpha=\sin \beta=\frac{a}{c}$
15. Simplify the radical expression $\frac{\sqrt{9 x^{2}}-4 \sqrt{x^{3}}}{3-4 \sqrt{x}}, x>0$
a) $x$
b) $-x$
c) $2 x$
d) $x \sqrt{x}$
16. Assume that $\sin x=\frac{1}{2}$ and $\frac{\pi}{2} \leq x \leq \pi$. 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 $2 x$ is given by
a) $6 x+c$
b) $\frac{3}{2} x^{2}+c$
c) $x^{2}+c$
d) $3 x^{2}+c$
18. The area of a semi-circle is $2 \pi \mathrm{~cm}^{2}$. The diameter of the circle is
a) 4 cm
b) 2 cm
c) 6 cm
d) 16 cm
19. Solve for x the equation $\frac{1}{x-6}=\frac{3}{5 x+1}$
a) $-\frac{19}{2}$
b) $-\frac{7}{2}$
c) $\frac{19}{2}$
d) $-\frac{12}{4}$
20. Consider the system of equations

$$
\left\{\begin{array}{c}
2 y+3 x=38 \\
y-2 x=12
\end{array}\right.
$$

Then, $\frac{y}{x}=$
a) 8
b) 16
c) 2
d) 10

