Calculus ABC Test I—Version 1617 **Name:** Key

Lecture section: _____ **Student Number:** _____

PUT ANSWERS IN BOXES. NO BOOKS/NOTES/CALCULATORS. DO YOUR OWN WORK.
Simplify answers where possible. Include units where needed. All angles are in radians. $\log = \log_{10}$.

1. Simplify by combining using a common denominator:

$$\frac{x}{(x-2)(x+2)} + \left(\frac{1}{x-2}\right)\left(\frac{x+2}{x+2}\right) \quad \frac{x}{x^2-4} + \frac{1}{x-2} \quad \frac{x+x+2}{(x-2)(x+2)} \quad \frac{2x+2}{(x-2)(x+2)}$$

$\boxed{\frac{2x+2}{(x-2)(x+2)}}$

2. Simplify by combining using a common denominator:

$$\left(\frac{x-1}{x-1}\right)\left(\frac{1}{x+1}\right) + \left(\frac{1}{x-1}\right)\left(\frac{x+1}{x+1}\right) = \frac{x-1+x+1}{(x-1)(x+1)}$$

$\boxed{\frac{2x}{(x-1)(x+1)}}$

3. Solve for t:

$$t\left(1+\frac{3}{t}\right) = (2)t \qquad t+3 = 2t \qquad 3 = t \checkmark$$

$\boxed{t = 3}$

4. Solve for r:

$$\sqrt{r+3} - 8 = 0 \qquad \sqrt{r+3} = 8 \qquad r+3 = 64 \qquad r = 61 \checkmark$$

$\boxed{r = 61}$

5. Solve for t:

$$-1 < 2t - 5 < 7 \qquad 2 < t < 6$$
$$+5 \quad +5 \quad +5$$
$$\frac{4}{2} < \frac{2t}{2} < \frac{12}{2}$$

$\boxed{2 < t < 6 \text{ or } (2, 6)}$

6. Find the equation of the line with x-intercept 1 and y-intercept 3 in *slope-intercept* form. (1, 0) (0, 3)

Slope: $\frac{3-0}{0-1} = -3$ $\quad y - 0 = -3(x-1)$ $\quad y = -3x + 3$

$\boxed{y = -3x + 3}$

7. Factor: $x^2 + 2x - 8$

$(x+4)(x-2)$

$\boxed{(x+4)(x-2)}$

8. Find the value of:

$$\sin\left(\frac{7\pi}{4}\right) \qquad \frac{7\pi}{4} = 315^\circ \text{ IV, neg}$$
$$-\sin 45$$

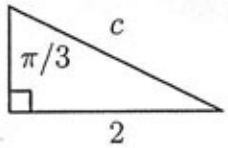
$\boxed{-\frac{\sqrt{2}}{2}}$

9. Find the value of:

$$\cos\left(\frac{4\pi}{3}\right) \qquad \frac{4\pi}{3} = 240^\circ \text{ III, neg}$$
$$-\cos 60$$

$\boxed{-\frac{1}{2}}$

10. Find the value of c:



$$\sin\frac{\pi}{3} = \frac{2}{c} \qquad \frac{\sqrt{3}}{2} = \frac{2}{c} \qquad \sqrt{3}c = 4 \qquad c = \frac{4}{\sqrt{3}}$$

$\boxed{c = \frac{4}{\sqrt{3}}}$

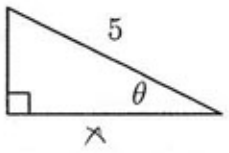
11. Find the value of $\sec(\theta)$:

$3^2+x^2=5^2$ $\quad \sec\theta = \frac{1}{\cos\theta}$

$9+x^2=25$

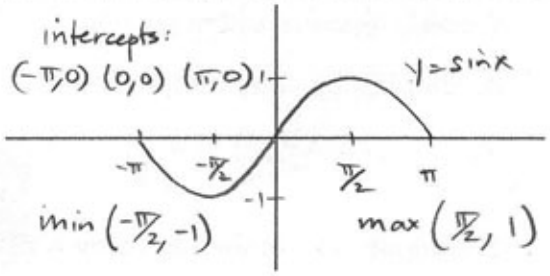
$x^2=16$

$x=4$



$\sec\theta = \frac{5}{4}$

12. Graph the function $y = \sin(x)$ for $-\pi \le x \le \pi$.
Label with the following values (if applicable): each intercept, location of each asymptote, and (x, y) coordinates of each min and max.



13. Simplify:

$(-32)^{2/5}$ $\quad \left(\sqrt[5]{-32}\right)^2 = (-2)^2 = 4$

4

14. Simplify:

$\left(x^2\right)^3$ $\quad x^{2\cdot3}$

x^6

15. Solve for x (write answer as a rational number):

$8^x = 16$ $\quad (2^3)^x = 2^4$

$3x = 4$

$x = 4/3$

$x = \frac{4}{3}$

16. Solve for x:

$\log 3^{x+2} = \log 7$ $\quad 3^{x+2} = 7$

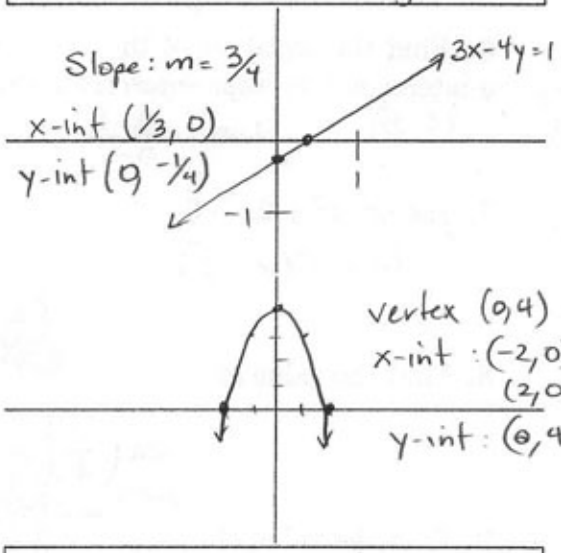
$(x+2)\log 3 = \log 7$ $\quad x+2 = \frac{\log 7}{\log 3}$

$x = \frac{\log 7}{\log 3} - 2$ or $x = \log_3 7 - 2$

17. Graph the equation $3x - 4y = 1$.
Label with the following values (if applicable): each intercept, slope, and (x, y) coordinates of vertex.

$3x - 1 = 4y$ $\quad$ x-int: $3x = 1$, $x = 1/3$

$\frac{3}{4}x - \frac{1}{4} = y$ $\quad$ y-int: $-4y = 1$, $y = -1/4$



18. Graph the function $y = 4 - x^2$.
Label with the following values (if applicable): each intercept, slope, and (x, y) coordinates of vertex.

19. Find the perimeter of a rectangle which has length 3 meters and width 10 meters.

$P = 2\ell + 2w = 2(3) + 2(10) = 26$

26 m

20. Find the volume of a rectangular box with sides 4 inches, 7 inches, and 7 inches.

$V = \ell \cdot w \cdot h = 4 \cdot 7 \cdot 7 = 196$

$196\ in^3$