Calculus ABC Test I—Version 7110 (Key)

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:

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

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

2. Simplify by combining using a common denominator:

$$\frac{-3}{-3}\left(\frac{x}{x-5}\right) + \frac{x-3}{15-3x} \qquad \frac{-3x+x-3}{15-3x}$$

$\frac{-2x+3}{15-3x}$ or $\frac{2x-3}{3x-15}$

3. Solve for w:

$$w^2(w-1)\left(\frac{1}{w-1}\right) - \left(\frac{4}{w^2}\right)^{w^2(w-1)} = 0(w^2)(w-1)$$

$w^2 - 4(w-1) = 0$ $\quad w^2 - 4w + 4 = 0$

$(w-2)(w-2) = 0$

$w = 2$ ✓

$w = 2$

4. Solve for a:

$$a^2 = 10$$

$a = \pm\sqrt{10}$

$a = \pm\sqrt{10}$

5. Solve for x:

$$-2x^2 \le 4 \qquad x = \text{all reals}$$

$x^2 \ge -2$

$x = \mathbb{R}$ or $(-\infty, \infty)$

6. Find the equation of the line through the point (-1,-2) and parallel to the line $x + 3y = 6$ in *point-slope* form.

$y+2 = -\frac{1}{3}(x+1)$ $\quad -x+6 = 3y$ $\quad y = -\frac{1}{3}x + 2$ (slope $-\frac{1}{3}$)

$y+2 = -\frac{1}{3}(x+1)$

7. Find all roots of: $2x^2 - 4x = 0$

$2x(x-2) = 0$

$x = 0, x = 2$ ✓

$x = \{0, 2\}$

8. Find the value of:

$$\sin\left(\frac{\pi}{6}\right) \qquad \frac{\pi}{6} = 30°$$

$\frac{1}{2}$

9. Find the value of:

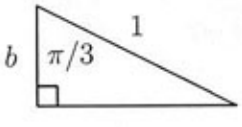
$$\sin\left(\frac{\pi}{3}\right) \qquad \frac{\pi}{3} = 60°$$

$\frac{\sqrt{3}}{2}$

10. Find the value of b:

$\cos\frac{\pi}{3} = \frac{b}{1}$

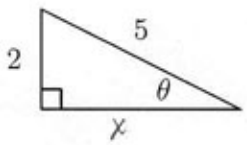
$\frac{1}{2} = b$



$b = \frac{1}{2}$

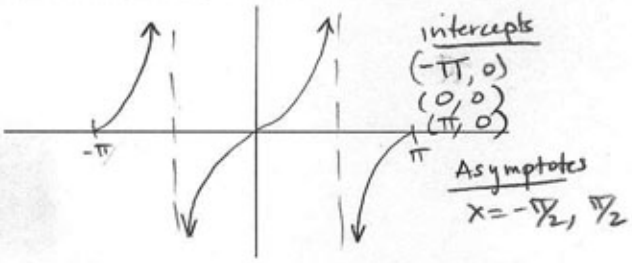
11. Find the value of $\cot(\theta)$:

$2^2+x^2=5^2$ $\quad x^2=21$ $\quad x=\sqrt{21}$ $\quad \cot\theta=\frac{1}{\tan\theta}$ $\quad \cot\theta=\frac{\sqrt{21}}{2}$



$\cot\theta = \frac{\sqrt{21}}{2}$

12. Graph the function $y = \tan(x)$ 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 and eliminate any negative exponents:

$\left(\frac{1}{4}\right)^{-2}$ $\quad \left(\frac{4}{1}\right)^2 = 16$

16

14. Simplify:

$\left(-2x^3\right)^2$ $\quad (-2)^2(x^6)$ $\quad 4x^6$

$4x^6$

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

$32^{3r} = 2$ $\quad (2^5)^{3r} = 2^1$

$15r = 1$

$r = 1/15$

$r = \frac{1}{15}$

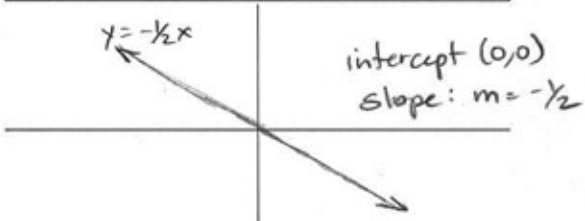
16. Solve for x:

$(4^{-1})^x = 75$ $\quad 4^{-x} = 75$ $\quad -x \log 4 = \log 75$

$\left(\frac{1}{4}\right)^x = 75$ $\quad x = \frac{-\log 75}{\log 4}$

$x = \frac{-\log 75}{\log 4}$ or $x = -\log_4 75$

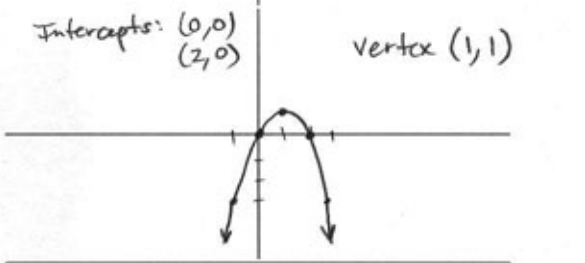
17. Graph the function $y = -\frac{1}{2}x$.
Label with the following values (if applicable): each intercept, slope, and (x, y) coordinates of vertex.



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

Vertex: $x = \frac{-b}{2a} = \frac{-2}{2(-1)} = 1$

$y = 2(1) - 1^2 = 1$



19. Find the area of a sector of a circle of radius 1 foot swept by the angle $2\pi/7$ radians.

$A = \left(\frac{2\pi}{7} / 2\pi\right)(\pi r^2) = \frac{1}{7}\pi(1)^2 = \frac{\pi}{7}$

$\frac{\pi}{7}$ ft^2

20. Find the volume of a right circular cylinder (a can) with radius 3 inches and height 6 inches.

$V = \pi r^2 h = \pi(3^2)(6)$

$= 54\pi$

54π in^3