MTH 141 and 161 Basic Skills Exam

September 15, 2022

NAME (please print legibly): _____

Your University ID Number: _____

Pledge of Honesty

I affirm that I will not give or receive any unauthorized help on this exam, and that all work will be my own.

Signature: _____

Enter your answers where indicated in order to receive credit. Calculators and notes are not permitted. If you are confused about the wording of a question or need a clarification, you should raise your hand and **ask a proctor** about it.

1. (12 points) For this problem, justification is not required and partial credit will **not** be awarded. Decide which entry (if any) is equivalent to the given expression:

(a) $\dfrac{2x}{2x+y} =$

- ☐ $\dfrac{1}{y}$
- ☐ $1 - \dfrac{2x}{y}$
- ☐ $\dfrac{x}{x+2y}$
- ☐ $\dfrac{1}{1+\dfrac{y}{2x}}$
- ☐ None of the above

(b) $\sqrt{x^2+9} =$

- ☐ $|x+3|$
- ☐ $(x-3)(x+3)$
- ☐ $\dfrac{x}{\sqrt{x^2+9}}$
- ☐ x^4+81
- ☐ None of the above

(c) $\dfrac{3x}{3y/z} =$

- ☐ $\dfrac{3x+z}{3y}$
- ☐ $\dfrac{xz}{y}$
- ☐ $\dfrac{9xz}{y}$
- ☐ $\dfrac{x}{9yz}$
- ☐ None of the above

2. (8 points) A line L contains the points (c, d) and (e, f). Determine the y-intercept of L in terms of c, d, e and f. Show your work and put your answer in the answer box. (You may assume $c \neq e$.)

Answer:

3. (10 points) For each part, show your work and put your answer in the answer box.

(a) Find all x satisfiying the inequality:

$$2(x-1)^2(x+6) \leq 0.$$

Answer:

(b) Solve for x:

$$|x - 3| = |x|.$$

Answer:

4. (16 points) For each part, show your work and put your answer in the answer box.

(a) Evaluate $e^{2\ln(7)}$ in simplest form.

Answer:

(b) Find an integer x satisfying: $\frac{200}{x\sqrt{x}} - \frac{75}{x\sqrt{x}} = 1$.

Answer:

(c) Solve for x:

$$\log_2(x) + \log_2(x-2) = 3$$

Answer:

(d) Find all solutions for x: $e^{2x} - 9e^x + 20 = 0$.

Answer:

5. (13 points) Let $f(x) = \dfrac{x+2}{x-3}$.

(a) (7pts) Determine its inverse, $f^{-1}(x)$.

(b) (6pts) Determine the domain and range of f, as well as the domain and range of f^{-1}.

6. (16 points) For this problem, justification is not required and partial credit will **not** be awarded. In each part, evaluate the expression and put your answer in the answer box.

(a) $\log_8(64) =$

Answer:

(b) $\log_{27}(3) =$

Answer:

(c) $\log_{27}\left(\frac{1}{3}\right) =$

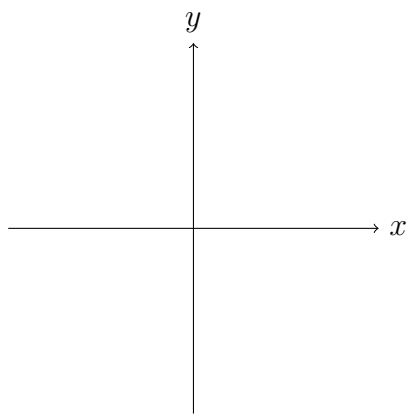
Answer:

(d) $\log_5(4) - \log_5(100) =$

Answer:

7. (15 points) For each of the following θ, draw the angle whose radian measure is θ on the axes provided. Then determine $\sin\theta$, $\tan\theta$, and $\sec\theta$.

(a) $\theta = \dfrac{2\pi}{3}$

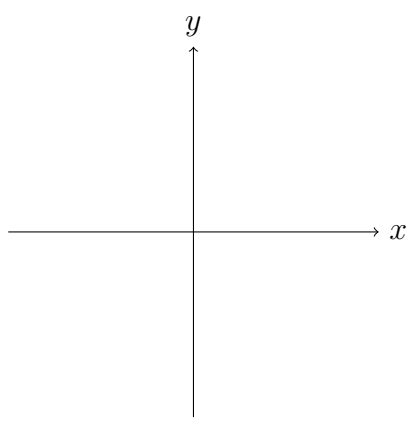


(a) $\sin\theta =$_____

(b) $\tan\theta =$_____

(c) $\sec\theta =$_____

(b) $\theta = \dfrac{19\pi}{6}$

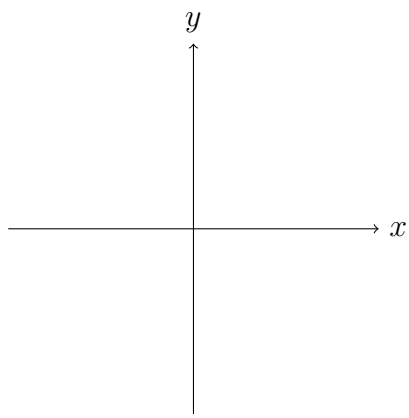


(a) $\sin\theta =$_____

(b) $\tan\theta =$_____

(c) $\sec\theta =$_____

(c) $\theta = \dfrac{-3\pi}{4}$

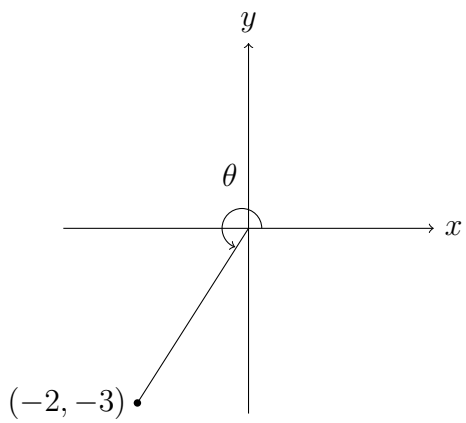


(a) $\sin\theta =$_____

(b) $\tan\theta =$_____

(c) $\sec\theta =$_____

8. (10 points) For the angle θ pictured below, find $\sin(\theta)$ and $\tan(\theta)$. Show all work.

(a) $\sin\theta =$_____

(b) $\tan\theta =$_____