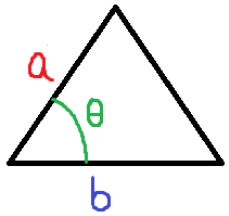
CSD1251/CSD1250 Homework 9

Due: 12th March 2023, 2359 HRS

For each question, key in **the** correct option into the homework into the "Homework 9" option in the "5 March to 11 March" section in our meta course page on Moodle.

For Questions $1-3$, we take reference to the triangle as described in the figure below.



The area of this triangle with sides of lengths a and b and contained angle θ is (You can derive this formula using standard TOA CAH SOH, try it!)

$$A = \frac{1}{2}ab\sin\theta.$$

Question 1

If $a = 2$ cm, and $b = 3$ cm, and θ increases at a rate of 0.2 rad/min, how fast is the area increasing (in cm^2/min) when $\theta = \frac{\pi}{3}$?

(a) $\frac{3}{5}$ (b) $\frac{3}{10}$ (c) $\frac{1}{5}$ (d) $\frac{3\sqrt{3}}{4}$ (e) None of these

Question 2

If $a = 2$ cm, b increases at a rate of 1.5 cm/min, and θ increases at a rate of 0.2 rad/min, how fast is the area increasing (in cm^2/min) when $b = 3$ cm and $\theta = \frac{\pi}{3}$?

(a) $\frac{3}{5}$ (b) $\frac{3}{10}$ (c) $\frac{15\sqrt{3}}{8}$ (d) $\frac{3\sqrt{3}}{4}$ (e) None of these

Question 3

If a increases at a rate of 2.5 cm/min, b increases at a rate of 1.5 cm/min, and θ increases at a rate of 0.2 rad/min, how fast is the area increasing (in cm^2/min) when $a = 2$ cm, $b = 3$ cm, and $\theta = \dfrac{\pi}{3}$?

(a) $\dfrac{21\sqrt{3}}{8}$ (b) $\dfrac{3}{10}$ (c) $\dfrac{15\sqrt{3}}{8}$ (d) $\dfrac{3\sqrt{3}}{4}$ (e) None of these

Question 4

Which of the following is not a local extreme **value** of $f(x) = 3x^4 - 16x^3 + 6x^2 + 72x$?

(a) 88 (b) 81 (c) -47 (d) 2 (e) None of these

Question 5

Which of the following is not a local extreme **point** of $f(x) = 3x^4 - 16x^3 + 6x^2 + 72x$?

(a) -2 (b) 3 (c) -1 (d) 2 (e) None of these

Question 6

Which of the following is a local maximum point of $f(x) = x^4 + 4x^3 - 8x^2 - 48x$?

(a) -3 (b) 3 (c) -2 (d) 2 (e) None of these

Question 7

Which of the following is a local minimum point of $f(x) = -x^4 + 12x^3 - 40x^2 + 48x$?

(a) 1 (b) 2 (c) -2 (d) 6 (e) None of these