UTS College | UNIVERSITY OF TECHNOLOGY SYDNEY

THE MATH READINESS TEST

SAMPLE QUESTIONS

Time Allowed: 60 minutes

Number of Questions: **25**

Instructions:

1. Attempt ALL questions.
2. For each multiple-choice question select only ONE answer.
3. Non-programmable calculators may be used.
4. You may use working out paper.

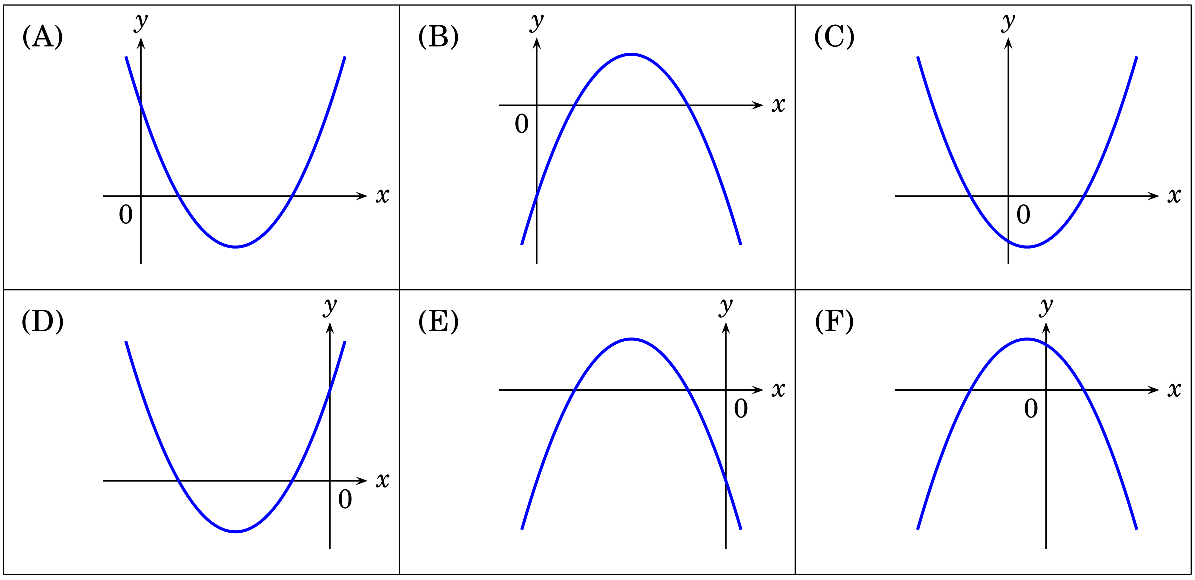
PART I – PRE-CALCULUS

1. The *simplest* form of $\dfrac{18a^3b^{-\frac{4}{5}}c}{42a^{-\frac{1}{4}}b^2c^{\frac{1}{3}}}$ is:

(A) $\dfrac{3a^{\frac{11}{4}}c^{\frac{2}{3}}}{7b^{\frac{14}{5}}}$ (B) $\dfrac{3a^{\frac{13}{4}}c^{\frac{4}{3}}}{7b^{\frac{14}{5}}}$ (C) $\dfrac{3a^{\frac{13}{4}}c^{\frac{2}{3}}}{7b^{\frac{14}{5}}}$ (D) $\dfrac{3a^{\frac{13}{4}}c^{\frac{2}{3}}}{7b^{\frac{16}{5}}}$

---

2. Which of the following parabolas could have the equation $y = (3x-2)(7-2x)$?



---

3. The expression $63 + 52x - 96x^2$ can be factorised as:

(A) $(16x+7)(9-6x)$

(B) $(12x+7)(9-8x)$

(C) $(16x+3)(21-6x)$

(D) $(12x+21)(3-8x)$

---

4. If $\log_2(9x-11) = 4$ then x is equal to:

(A) 3 (B) -6 (C) 6 (D) -3

---

5. Which equation represents the line perpendicular to $11x - 13y = 15$, passing through the point $(2,-3)$?

(A) $13x - 11y = 7$

(B) $13x + 11y = -7$

(C) $13x - 11y = -7$

(D) $13x + 11y = 7$

---

6. If $\dfrac{7}{2x-1}=\dfrac{9}{6x+7}$ then x is equal to:

(A) $\dfrac{29}{12}$ (B) $-\dfrac{39}{12}$ (C) $\dfrac{39}{12}$ (D) $-\dfrac{29}{12}$

---

7. If $\tan\theta=\dfrac{9}{7}$ and $\sin\theta<0$, then $\sin\theta$ is equal to:

(A) $-\dfrac{11}{\sqrt{130}}$ (B) $-\dfrac{7}{\sqrt{130}}$ (C) $-\dfrac{9}{\sqrt{130}}$ (D) $-\dfrac{8}{\sqrt{130}}$

---

8. If $\log_{256}x=\dfrac{3}{4}$ then x is equal to:

(A) 64 (B) 32 (C) 128 (D) 96

---

9. Find all values of x for which $|9x-2|\le\dfrac{1}{5}$.

(A) $\dfrac{1}{5}\le x\le\dfrac{11}{45}$ (C) $-\dfrac{11}{45}\le x\le\dfrac{1}{5}$

(B) $-\dfrac{1}{5}\le x\le\dfrac{11}{45}$ (D) $-\dfrac{11}{45}\le x\le-\dfrac{1}{5}$

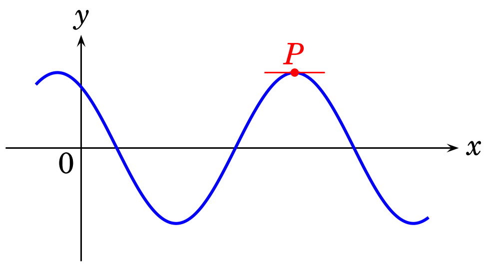
---

10. $\dfrac{1+\cos x}{\sin x}\left[1+\dfrac{(1-\cos x)^2}{\sin^2 x}\right]$ can be simplified to:

(A) $-\dfrac{2}{\sin x}$ (B) $\dfrac{2}{\sin x}$ (C) $\dfrac{2}{\tan x}$ (D) $-\dfrac{2}{\tan x}$

---

11. The graph of the function $y=\cos\left(2x+\dfrac{\pi}{5}\right)$ is shown below:



What are the coordinates of the point P?

(A) $\left(\dfrac{7\pi}{10},1\right)$ (B) $\left(\dfrac{9\pi}{10},\dfrac{1}{2}\right)$ (C) $\left(\dfrac{9\pi}{10},1\right)$ (D) $\left(\dfrac{7\pi}{10},\dfrac{1}{2}\right)$

---

12. The cubic curve $y = ax^3 + bx^2 + cs + d$ passes through the point $(-3,5)$, intersects the y-axis at $y = 4$ and intersects the x-axis at $x = 2$.

Which of the following equality is correct?

(A) $7a - b + c = 1$

(B) $7a + b - c = -1$

(C) $7a + b - c = 1$

(D) $7a - b + c = -1$

---

13. $\dfrac{(x^4-1)(3x^2+6x+12)}{(2x-2)(x^2+1)(x^3-8)}$ is simplified to:

(A) $\dfrac{3(x-1)}{2(x-2)}$ (B) $\dfrac{3(x-1)}{2(x+2)}$ (C) $\dfrac{3(x+1)}{2(x+2)}$ (D) $\dfrac{3(x+1)}{2(x-2)}$

---

14. The domain of the function $y = \dfrac{\sqrt{1-3x}}{(x+1)\sqrt{3x+5}}$ is

(A) $-\frac{1}{3} < x < \frac{3}{5}$ and $x \neq -1$.

(B) $\frac{1}{3} < x < \frac{3}{5}$ and $x \neq -1$.

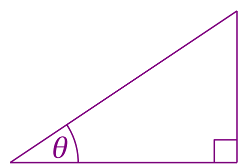
(C) $-\frac{3}{5} < x < \frac{1}{3}$ and $x \neq -1$.

(D) $-\frac{3}{5} < x < -\frac{1}{3}$ and $x \neq -1$.

---

15. Evaluate $\sec\left(\tan^{-1}\frac{2}{5}\right)$.

Hint. Use the diagram. Keep in mind that the part inside the brackets is an angle, so let it equal θ. Then construct a right angled triangle and find all its sides. This will lead to the answer.



(A) $\dfrac{5}{\sqrt{29}}$ (B) $\dfrac{\sqrt{29}}{5}$ (C) $\dfrac{\sqrt{29}}{2}$ (D) $\dfrac{2}{\sqrt{29}}$

PART II – BASIC CALCULUS

16. The first derivative of $y = 4\left(2x^3 - 5\right)^4\left(5x^6 + 3\right)^5$ is:

(A) $24x^2\left(2x^3 - 5\right)^4\left(5x^6 + 3\right)^3\left(70x^6 - 125x^3 + 12\right)$

(B) $96x^2\left(2x^3 - 5\right)^3\left(5x^6 + 3\right)^4\left(70x^6 - 125x^3 - 12\right)$

(C) $300x^2\left(2x^3 - 5\right)^3\left(5x^6 + 3\right)^3\left(70x^6 - 125x^3 + 12\right)$

(D) $24x^2\left(2x^3 - 5\right)^3\left(5x^6 + 3\right)^4\left(70x^6 - 125x^3 + 12\right)$

---

17. $\int \left(6x^2 + 4\right)\left(x^3 + 2x - 5\right)^9 dx$ is equal to:

(A) $\dfrac{\left(x^3 + 2x - 5\right)^{10}}{10} + C$

(B) $\dfrac{5\left(x^3 + 2x - 5\right)^9}{9} + C$

(C) $\dfrac{\left(x^3 + 2x - 5\right)^{11}}{10} + C$

(D) $\dfrac{\left(x^3 + 2x - 5\right)^{10}}{5} + C$

---

18. If $f(x) = \dfrac{\sin 3x}{\cos 2x}$ then $f'\left(\dfrac{\pi}{3}\right)$ is equal to:

(A) $\dfrac{1}{6}$

(B) 1

(C) 6

(D) $\dfrac{1}{3}$

---

19. $\int \left(x^2 - \dfrac{5x}{3} + \dfrac{2}{3}\right) e^{2x^3 - 5x^2 + 4x + 1}\, dx$ is equal to:

(A) $\dfrac{1}{6} e^{2x^3 - 5x^2 + 4x + 1} + C$

(B) $\dfrac{2}{3} e^{2x^3 - 5x^2 + 4x + 1} + C$

(C) $\dfrac{x}{6} e^{2x^3 - 5x^2 + 4x + 1} + C$

(D) $\dfrac{x}{3} e^{2x^3 - 5x^2 + 4x + 1} + C$

---

20. The equation of the tangent to the graph of $y = f(x) = \dfrac{1 - x}{1 + x^2}$ at the point where $x = -3$ is:

(A) $y = \dfrac{7y + 41}{50}$

(B) $y = -\dfrac{7y + 11}{50}$

(C) $y = -\dfrac{7y + 41}{50}$

(D) $y = \dfrac{7y + 11}{50}$

---

21. Evaluate $\displaystyle\int \frac{3\cos 3x - 5\sin 5x}{(\sin 3x + \cos 5x)^4}\,dx$ by using the substitution $u = \sin 3x + \cos 5x$.

(A) $\dfrac{1}{3(\sin 3x + \cos 5x)^3} + C$

(B) $-\dfrac{2}{3(\sin 3x + \cos 5x)^3} + C$

(C) $-\dfrac{1}{3(\sin 3x + \cos 5x)^3} + C$

(D) $\dfrac{2}{3(\sin 3x + \cos 5x)^3} + C$

---

22. The gradient of a curve is given by $\dfrac{dy}{dx} = 1 + 4\cos 3x - 3\sin 4x$. The curve passes through the point $(0, -\frac{1}{4})$. What is the equation of the curve?

(A) $y = x + \dfrac{4}{3}\sin 3x + \dfrac{3}{4}\cos 4x - 1$

(B) $y = x + \dfrac{4}{3}\sin 3x - \dfrac{3}{4}\cos 4x + \dfrac{1}{2}$

(C) $y = x - \dfrac{3}{4}\sin 3x + \dfrac{4}{3}\cos 4x - \dfrac{19}{12}$

(D) $y = x - \dfrac{3}{4}\sin 3x - \dfrac{4}{3}\cos 4x + \dfrac{13}{12}$

---

23. Find k if $\displaystyle\int_1^k \frac{16x}{(1+x^2)^3}\,dx = \frac{21}{25}$.

(A) $k = 0$

(B) $k = \pm 2$

(C) $k = \pm 1$

(D) $k = \pm 5$

---

24. The ***exact*** value of $\displaystyle\lim_{x \to 11} \frac{x - 11}{\sqrt{x} - \sqrt{11}}$ is:

(A) $\dfrac{0}{0}$

(B) $2\sqrt{11}$

(C) $\dfrac{1}{2\sqrt{11}}$

(D) 6.63325

---

25. Differentiate $f(x) = \log_e(\tan x)$.

(A) $\dfrac{1}{\tan x}$

(B) $\dfrac{\sec x}{\tan x}$

(C) $\dfrac{1}{\sin x \cos x}$

(D) $\dfrac{\operatorname{cosec} x}{\tan x}$

ANSWER KEY

1.	(C)	**2.**	(B)	**3.**	(B)	**4.**	(A)	**5.**	(B)
6.	(D)	**7.**	(C)	**8.**	(A)	**9.**	(A)	**10.**	(B)
11.	(C)	**12.**	(D)	**13.**	(D)	**14.**	(C)	**15.**	(B)
16.	(D)	**17.**	(D)	**18.**	(C)	**19.**	(A)	**20.**	(A)
21.	(C)	**22.**	(A)	**23.**	(B)	**24.**	(B)	**25.**	(C)