

SAMPLE EXAM II MATH 150

1. Exactly one of the following equations has $\frac{3}{4}$ and $\frac{2}{5}$ as two of its possible rational roots. Which one is it?
- a) $6x^4 - 23x^3 + 23x + 20 = 0$ b) $20x^4 - 23x^3 - 26x^2 - 23x + 6 = 0$
c) $12x^4 + 24x^3 - 15x^2 + 6x + 15 = 0$ d) $15x^4 - 10x^3 + 21x^2 + 16x + 12 = 0$
e) none of the above
2. If $2x^4 - x^2 + x - 5$ is divided by $x - 2$ the quotient and remainder are:
- a) quot: $2x^3 - 4x^2 + 7x - 13$ rem: 21
b) quot: $2x^3 + 4x^2 + 7x - 15$ rem: 25
c) quot: $2x^3 + 4x^2 + 7x + 15$ rem: 25
d) quot: $2x^3 - 4x^2 + 7x + 15$ rem: 20
e) none of the above
3. Let $f(x) = 2x^3 - 8x^2 - 2x + 8$. Which of the following statements follows from the Factor Theorem?
- (i) since $x - 1$ is a factor of $f(x)$, $f(1) = 0$
(ii) since $f(4) = 0$, $x + 4$ is a factor of $f(x)$
(iii) since $f(-1) = 0$, $x + 1$ is a factor of $f(x)$
(iv) since $f(2) \neq 0$, $x - 2$ is not a factor of $f(x)$
- a) i, iii, and iv only b) i, and iii only
c) i, ii, and iii only d) all four statements
4. Given that $1 + i$ is a root of the equation $x^3 - 5x^2 + 8x - 6 = 0$; the other roots are:
- a) 2 and 3 b) 2 and $1 - i$ c) 3 and $1 - i$ d) -3 and $1 - i$

5. A list of all solutions of the equation $x^3 - 8x^2 + 19x - 14 = 0$ is:
a) 2 and $3 \pm \sqrt{2}$ b) 7 and $3 \pm 2i$ c) 2 and $2 \pm 3i$ d) 7 and $3 \pm \sqrt{2}$

6. According to Descartes' rule of signs, which of the following are possibilities regarding the roots of $3x^3 + 5x^2 - 4x - 3 = 0$

- (i) 1 pos root and 2 neg roots
(ii) 1 pos root and 2 nonreal complex roots
(iii) 2 pos roots and 1 neg root
(iv) 1 negative root and 2 nonreal complex roots

- a) (i) and (iv) only b) (i) and (ii) only
c) (iii) and (iv) only d) (ii) and (iii) only e) other

7. Let $P(x) = 2x^5 - 3x^4 + 6x^3 - 5x^2 + 4x - 6$. A least upper bound for the roots of $P(x) = 0$ is :

- a) 1 b) 2 c) 3 d) 6

8. Which of the following are possible rational roots of $3x^5 + 2x^3 - 7x + 10$?

- (i) 3 (ii) $3/5$ (iii) -7 (iv) $3/10$
a) i, ii, iii, and iv b) i, iii, iv c) iii d) none of the above

9. Simplify $\frac{5}{2} \log_4 16$

- a) 10 b) 5 c) 1/2 d) $\log_{32} 16$ e) none of the above

10. Write in logarithmic form : $5^3 = 125$

- a) $\log_5 3 = 125$ b) $\log_5 125 = 3$ c) $\log_3 5 = 125$
d) $\log_3 125 = 5$

11. Solve for x: $\log_4 x = -3/2$

- a) 8 b) - 8 c) 1/8 d) 81/16 e) none of the above

12. If $\log p = 2.3$, find $\log p^2$

- a) 5.29 b) $10^{2.3}$ c) 4.6 d) 2.3^{10} e) none of the above

13. Given $\log a = 2.1$, $\log b = 1.8$ and $\log c = 4.5$. Evaluate $\log \frac{a^2 b}{c^3}$

- a) 4.808 b) 0.9 c) 1.5 d) 4.5 e) none of the above

14. An initial population P_0 grows to size P in t years, where $P = P_0 e^{.3t}$.

Find the population after 8 years if the initial population is 400.

- a) 3628 b) 960 c) 9600 d) 4409 e) none of the above

15. The graph of $y = 1 + \log_3 x$ passes through the points :

- a) (8,2) , (2,1) , (0,0)
- b) (3,2) , (9,3) , (1,1)
- c) (0,1) , (-1,2), (1,4)
- d) (3,2) , (2,1) , (-2/3,-1)
- e) none of the above

16. Solve: $4^{x+2} = 8^{x-1}$

- a) -1 b) 5 c) 7 d) 0 e) none of the above

17. Solve: $\log (2x - 16) = \log (x-4) + 1$

- a) 3 b) 12 c) 13 d) 5 e) none of the above

18. Given: $\log a = .4$ and $\log b = 1.2$ Evaluate: $\log_a b$

- a) .333 b) 3 c) 6.3 d) 2 e) none of the above

19. Suppose that \$2000 is invested in an account that pays 5.25% interest compounded continuously. How much money will the account contain (assuming no withdrawals) after 4 yrs?

- a) \$ 2,456.52 b) \$ 3,243.62 c) \$ 3,210.92
d) \$ 2,467.36 e) none of the above

20. Find the linear velocity in ft per second of a wheel 8 inches in diameter that is turning at 90 rev/min.

- a) π b) 360 c) 720π d) 12π e) none of the above

21. Find the central angle that intercepts an arc of 10 cm in a circle with diameter of 8 cm.

- a) 40° b) 143.2° c) 286.4° d) 250° e) none of the above

22. The polynomial with real coefficients of lowest degree with roots of 2, -1, and $3i$ is:

- a) $f(x) = (x + 2)(x - 1)(x + 3i)$
b) $f(x) = (x + 2)(x - 1)(x + 3i)(x - 3i)$
c) $f(x) = (x - 2)(x + 1)(x - 3i)$
d) $f(x) = (x - 2)(x + 1)(x - 3i)(x + 3i)$

e) none of the above

23. The sum of all the roots of $x^3 - x^2 - 22x + 40$ is:

- a) 6 b) 1 c) 7 d) 5 e) none of the above

24. Evaluate: $\cos 150^\circ \sin(-120^\circ)$

- a) $3/2$ b) 3 c) $-3/2$ d) $3/4$ e) none of the above

25. The amplitude and period of $y = 2 \sin \beta$ is:

- a) amp = 2 period = β b) amp = 4 period = 2
c) amp = 2 period = 2π d) amp = -2 period = π
e) none of the above