

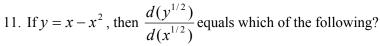
	(a) 4	(b) 3	(c) 22	(d) 12	(e) NOTA
2.	The position of a particle moving along a straight line is given by $s(t) = t^3 - 6t^2 + 12t - 8$. Find the timinterval where the particle's velocity is decreasing.				
	(a) $(2, \infty)$	(b) $(-\infty, \infty)$	(c) $(-\infty,3)$	(d) $(-\infty,1) \cup (2,\infty)$	(e) NOTA
3.	A particle moves along the parabola $x = 3y - y^2$, so that $\frac{dy}{dt} = 3$ at all times t. The speed of the particle				
	when it is at position (a) 0	(2, 1) is equal to (b) 3	(c) $\sqrt{13}$	(d) $3\sqrt{2}$	(e) NOTA
4.	Find the slope of the curve $y^3 - xy^2 = 4$ at the point where $y = 2$.				
	(a) -2	(b) $\frac{1}{2}$	$(c) - \frac{1}{2}$	$(d)^{1/4}$	(e) NOTA
5.	The position vector of a moving object is given by $P(t) = 3t\hat{i} + e^t\hat{j}$. Its acceleration is constant in neither (a) magnitude nor direction (b)constant in both magnitude and direction				
	(c) constant in magnitude only		(d) constant in direction only		(e) NOTA
6.	Approximate the value of the expression $\sin 3 - \cos 3$, using only the 3^{rd} order Maclaurin Series expansions for $\sin x$ and $\cos x$.				
	(a) 2	(b) -5	(c) 13	(d) 11	(e) NOTA
7.	The coefficient of x^3 in the Maclaurin series for $f(x) = e^{-x/2}$ is				
	(a)-1/8	(b) 1/8	(c) - 1/48	(d) 1/16	(e) NOTA
8.	The average area in cubic inches of all circles with radii between 2 and 5 inches is				
	(a) 7π	(b) 11π	(c) 13π	(d) $29\pi/2$	(e) NOTA
9.	Evaluate $\lim_{x\to 1} \left(\arcsin(x) \right)$	$\left(\frac{1-\sqrt{x}}{1-x}\right)$.			
	(a) Does not exist	(b) $\pi/3$	(c) 0	(d) $\pi/6$	(e) NOTA
10.	0. Evaluate $\int_{\ln 3}^{\ln 5} \frac{e^{3x-3}}{e^{x-4}} dx$.				
	(a) 16e	(b) 10 <i>e</i>	(c) 12 <i>e</i>	(d) 14e	(e) NOTA

1. A company estimates that the cost (in dollars) of producing of producing x items is given

cost function, find the marginal cost (in dollars) for producing 1000 items.

by $C(x) = 2600 + 2x + 0.001x^2$. Given that the marginal cost is defined to be the first derivative of the





- (a) 1-2x (b) $\frac{2x}{\sqrt{x-x^2}}$ (c) $\frac{\sqrt{x}(1-2x)}{\sqrt{x-x^2}}$ (d) $\frac{1-2x}{\sqrt{x}}$
- (e) NOTA
- 12. The diagonal of a cube is increasing at a rate of 5 feet per second. At what rate, in cubic feet per second, is the volume of the cube increasing when the length of one side of the cube is 2 feet?
 - (a) $20\sqrt{3}$
- (b) $30\sqrt{2}$ (c) $\frac{20\sqrt{3}}{3}$
- (d) $40\sqrt{3}$
- (e) NOTA
- 13. Given the hyperbolic function $\sinh x = \frac{e^x e^{-x}}{2}$, evaluate $\int_{0}^{\ln 2} (\sinh x) dx$.
 - (a) 1/4
- (b) 5/4

- (e) NOTA

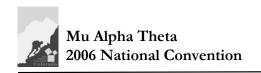
- 14. Let $y = x^{x^2}$. Find $\frac{dy}{dx}$ at x = 2.
- (c) $16 \ln 8 + 32$
- (d) $64 \ln 2 + 32$
- (e) NOTA

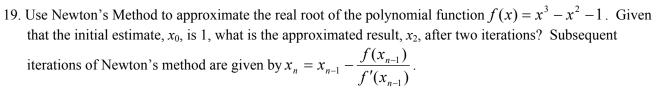
- 15. Evaluate $\lim_{x \to 0} \frac{\sqrt{6+2x} \sqrt{6+x^2}}{\sqrt{3+4x} \sqrt{3-x^3}}$.
 - (a) 1
- (b) $\frac{3\sqrt{2}}{4}$ (c) $\frac{\sqrt{2}}{4}$
- (e) NOTA

- 16. Evaluate $\int_{0}^{\pi/4} (1 + \tan^2 x) dx$
 - (a) It does not exist (b) 0
- (c) 2
- (d) -2
- (e) NOTA
- 17. Find the maximum value of the function $f(x) = \sqrt{3}\cos x + 5\sin x$ over the interval $[0, \pi]$.
 - (a) $3\pi/2$
- (b) 5
- (c) $3\sqrt{5}$
- (d) $2\sqrt{7}$
- (e) NOTA
- 18. A thin rod of length L lies along that part of the x-axis with $0 \le x \le L$. Its density, ρ , at (x, 0) is x^4 grams per unit length. The mass of the rod is given by the integral $\int pdx$, and the x-coordinate of the rod's

center of mass is given by the integral $\frac{1}{mass} \int_{0}^{L} xpdx$. Find the x-coordinate of the rod's center of mass.

- (a) 5L/6
- (b) 4L/5
- (c) 3L/4
- (e) NOTA





- (a) 2
- (b) 13/8
- (c) 3/2
- (d) 1
- (e) NOTA

20. Evaluate
$$\lim_{x\to 0} \frac{1}{2+10^{1/x}}$$
(a) 0 (b) ½

- (c) 1/12
- (d) Limit does not exist (e) NOTA

21. If
$$\int x^2 \cos x dx = f(x) - \int 2x \sin x dx$$
, then $f(x) =$

- (a) $2\sin x + 2x\cos x + C$
- (b) $x^{2} \sin x + C$
- (c) $2x\cos x x^2\sin x + C$
- (d) $4\cos x 2x\sin x + C$

- (e) NOTA
- 22. Given two lines, y = bx and y = 3bx, find a value of b which maximizes θ , the acute angle between the two lines.
 - (a) $\frac{\sqrt{3}}{2}$
- (b) ½
- (c) π/6
- (d) $\frac{\sqrt{3}}{2}$
- (e) NOTA

23. Evaluate
$$\int \frac{x^2}{\sqrt{4-x^2}} dx$$
 using the substitution $x = 2\sin\theta \ (-\frac{\pi}{2} < \theta < \frac{\pi}{2})$.

- (a) $2\cos^{-1}\frac{x}{2} \frac{x\sqrt{4-x^2}}{2} + C$ (b) $2\sin^{-1}\frac{x}{2} \frac{x\sqrt{4-x^2}}{2} + C$
- (c) $\cos^{-1}\frac{x}{2} \frac{x\sqrt{4-x^2}}{2} + C$ (d) $\sin^{-1}\frac{x}{2} \frac{x\sqrt{4-x^2}}{2} + C$
- (e) NOTA

24. Evaluate
$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{2n^2 + 2kn + k^2}{n^3}$$
 (Hint: Consider the limit as a Riemann Sum).

- (d) 10/3
- (e) NOTA

25. Find the arc length of the parametric curve given by the equations $x(t) = 2(\cos t + t \sin t)$ and $y(t) = 2(\sin t - t \cos t)$ on the interval $0 \le t \le \pi$. The arc length of a parametric curve is given

by
$$\int_{a}^{b} \sqrt{(dx/dt)^2 + (dy/dt)^2} dt$$
.

- (a) $\pi/2$
- (c) π^2
- (d) π
- (e) NOTA



- 26. The curvature of a function f(x) is a relative measure of how quickly the curve changes at a specified point, and is given by $\kappa(x) = \frac{|f''(x)|}{[1 + (f'(x))^2]^{3/2}}$. The radius of curvature is defined to be the reciprocal of the curvature at a given point. Find the radius of curvature of the function $y = x^3$ when x = 1.
 - (a) $\frac{10^{3/2}}{6}$ (b) $\frac{6}{4^{3/2}}$ (c) $\frac{5}{3}$ (d) $\frac{6}{10^{3/2}}$

- (e) NOTA

- 27. Let $y = 1 + \frac{x}{2 + \frac{x}{1 + \frac{x}{2 + \frac{x}{1 + \dots}}}}$, where y > 0. Evaluate $\frac{dy}{dx}$ at x = 4.
 - (a) $\frac{1}{2}$
- (b) $\frac{1}{4}$
- (c) 1/6
- (d) 1/8
- (e) NOTA
- 28. A and B are real numbers such that $0 \le A \le 10$ and $0 \le B \le 5$. If values for A and B are randomly chosen, what is the probability that $\frac{A}{9-B^2} \le 1$? (Hint: Graph the inequality in the specified range and domain).
 - (a) 0.36
- (b) 0.32
- (c) 0.18
- (d) 0.40
- (e) NOTA
- 29. Which of the following is the correct integral for finding the surface area of the region bounded by the xaxis and the function $f(x) = x^2 + 2x + 2$ from x = 1 to x = 3 when revolved about the x-axis?
- (a) $2\pi \int_{1}^{3} (x^2 + 2x + 2)\sqrt{4x^2 + 8x + 6}dx$ (b) $\pi \int_{1}^{3} (x^2 + 2x + 2)^2 dx$ (c) $2\pi \int_{1}^{3} (x^2 + 2x + 2)\sqrt{4x^2 + 8x + 5}dx$ (d) $\pi \int_{1}^{3} x(x^2 + 2x + 2)dx$

- (e) NOTA
- 30. According to the Theorem of Pappus, the volume of a solid of revolution generated by revolving a region about an external axis is equal to the product of the area of the region and the distance traveled by the region's centroid during one revolution. Find the volume of the solid generated when the ellipse given by the equation $9x^2 + 16y^2 = 144$ is rotated about the line 3x + 4y = 25.
 - (a) $144\pi^2$
- (b) $120\pi^2$
- (d) $225\pi^2$
- (e) NOTA